MANILA project: testing innovative strategies to mitigate shellfish vulnerability to climate change and pollutants

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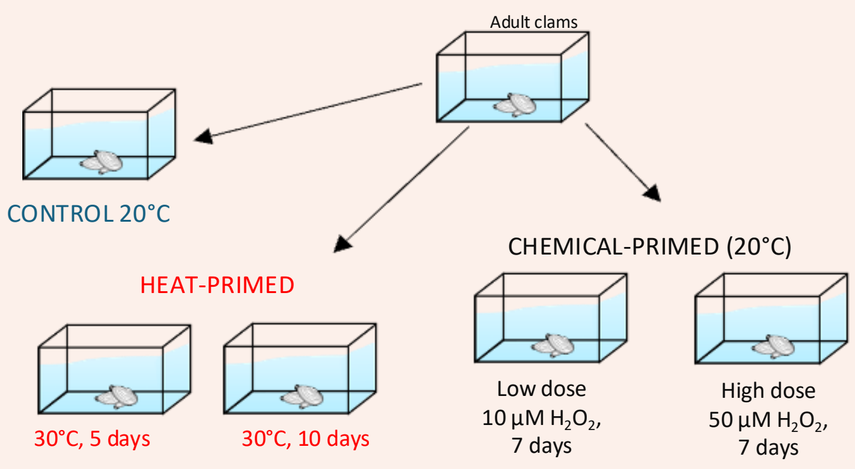
BACKGROUND

MANILA will develop novel strategies to enhance the performance of the Manila clam (*Ruditapes philippinarum*) under various stressful conditions. This will be achieved using innovative approaches such as priming and microbiota manipulation, with the ultimate goal of proposing new sustainable aquaculture management strategies to support shellfish farming.

WP1: Heat- and chemical-priming Manila clams to minimize the impact of multiple stressors

Task 1 - EXPLORING PRIMING TECHNIQUES

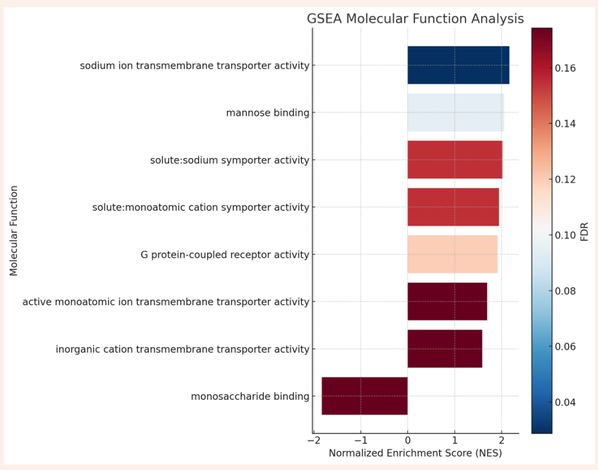
AIM:
DEFINE MOST PROMISING CHEMICAL AND THERMAL PRIMING TECHNIQUE



DIGESTIVE GLAND AND GILLS COLLECTED TO ANALYSE:
- GENE EXPRESSION PROFILES (RNA-SEQ)
- ANTIOXIDANT PROTECTION AND IMMUNE RESPONSE
- ATAC-SEQ FROM THE BEST HEAT- AND CHEMICAL PRIMING TREATMENT

RESULTS:

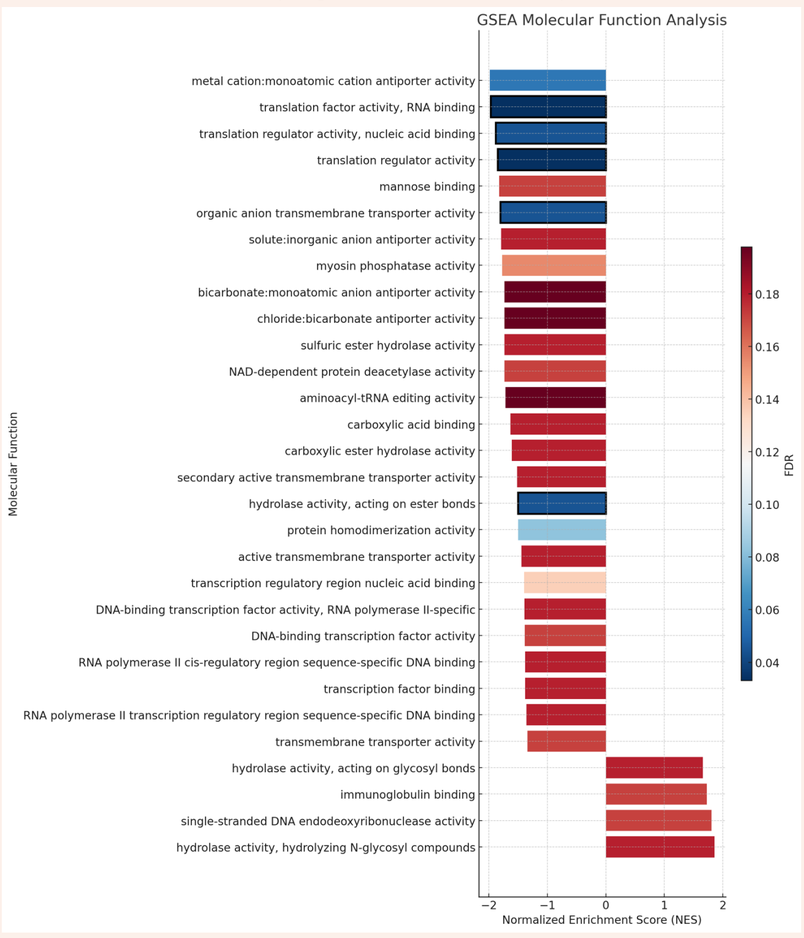
Digestive gland (High dose vs Control)



Dose Comparison: Compared the effects of two doses of the chemical priming; the higher dose was selected for the next task.

Thermal Priming: Identified optimal thermal priming conditions (30°C for 7 days).

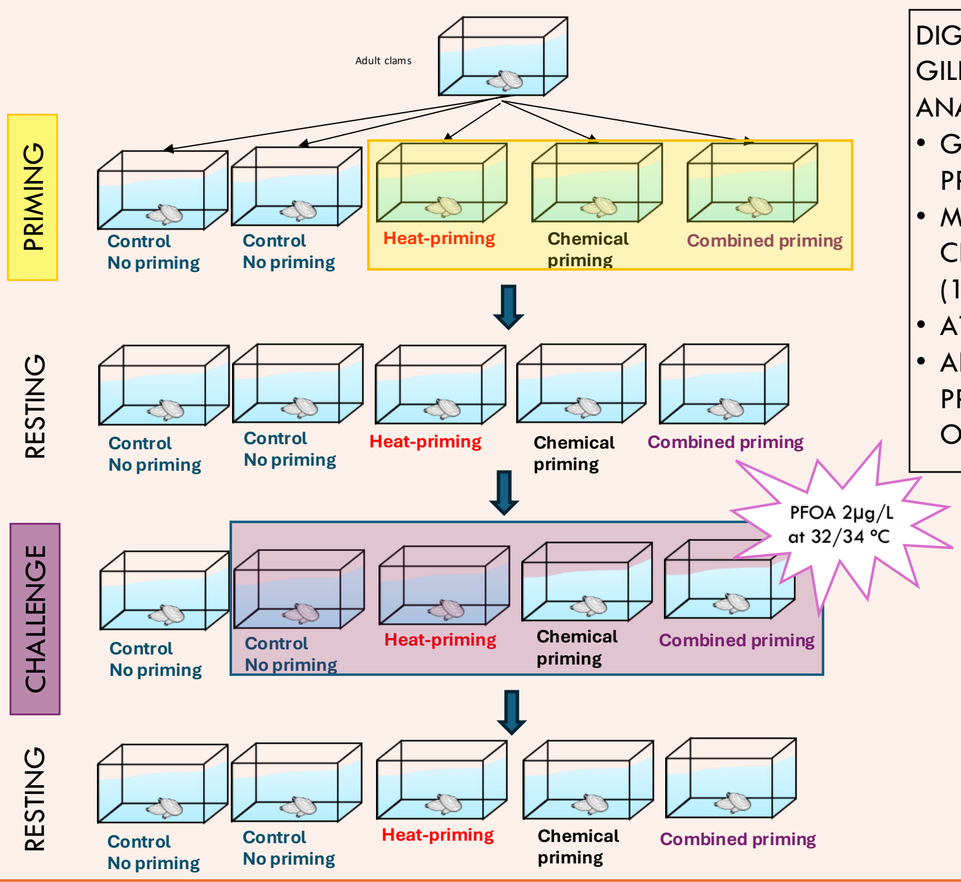
Gills (High dose vs Control)



For more details follow prof. Massimo Milan's presentation during the "CLIMATE CHANGE IMPACTS" session (Tuesday, August 27, AUD 10).

Task 2 - TESTING PRIMING EFFECTIVENESS

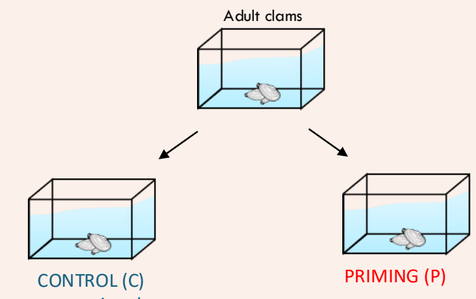
AIM:
TEST HEAT- AND CHEMICAL-PRIMNG EFFICIENCY TOWARDS MULTIPLE STRESSORS

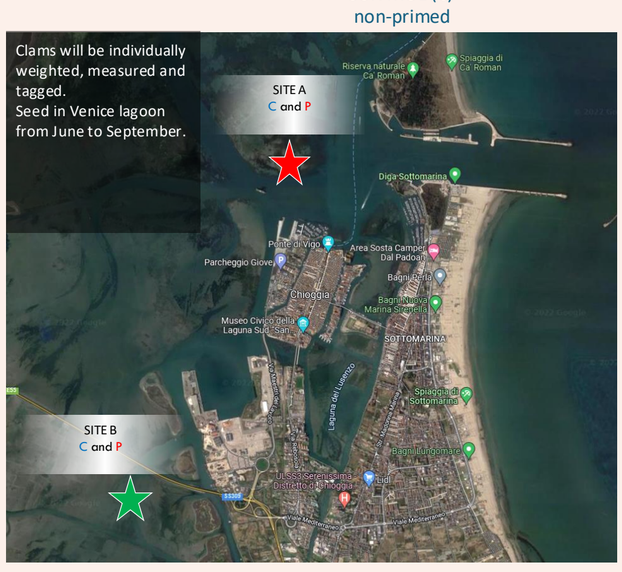


DIGESTIVE GLAND AND GILLS COLLECTED TO ANALYSE:
- GENE EXPRESSION PROFILES (RNA-SEQ)
- MICROBIOTA CHARACTERIZATION (16S)
- ATAC-SEQ
- ANTIOXIDANT PROTECTION AND OXIDATIVE DAMAGES

Task 3 - PRIMING VALIDATION IN FIELD CONDITIONS

AIM:
TEST PRIMING-EFFICACY TOWARDS SUMMER CONDITIONS OF THE VENICE LAGOON





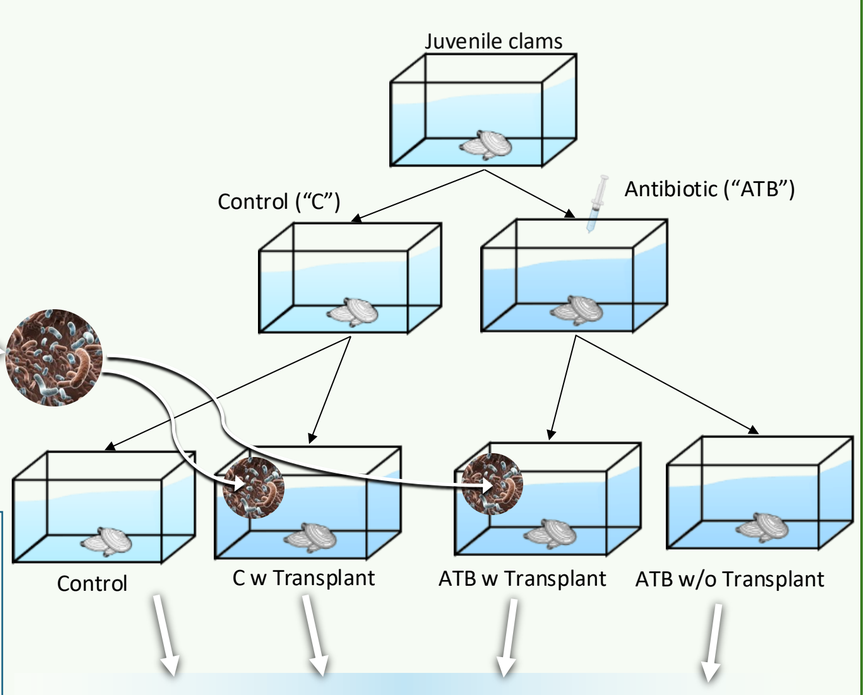
AFTER 3 MONTHS IN THE FIELD, CLAMS WILL BE COLLECTED TO ANALYSE:
- SURVIVAL
- GROWTH RATE
- CONDITION INDEX
- ANTIOXIDANT DEFENSES and OXIDATIVE DAMAGES
- IMMUNE FUNCTION

WP2: ROLE OF MICROBIOTA FROM POLLUTED AREA IN HOST-RESPONSE TO CHEMICAL STRESSORS

AIM:
HOW MICROBIOTA INFLUENCE CLAMS TOLERANCE TO CHEMICAL STRESSORS?

Microbiota of clams grown in a polluted industrial area of Venice lagoon will be transplanted in antibiotic-treated clams. The subsequent exposure to chemical stress in lab conditions will define the role of microbiota in clams' response to chemical stress.

MICROBIOTA TRANSPLANT



COMBINED EXPOSURE TO CHEMICALS (POLLUTED SEDIMENTS ELUTRIATE) AND HEAT WAVES (15 DAYS)

AFTER MULTIPLE STRESSORS CHALLENGE, CLAMS WILL BE COLLECTED TO ANALYSE:
- MORTALITY
- GROWTH PERFORMANCE
- BURROWING ACTIVITY
- GENE EXPRESSION PROFILES (RNA-SEQ)
- SHOTGUN METAGENOMIC SEQUENCING
- ANTIOXIDANT DEFENSES and OXIDATIVE DAMAGES
- IMMUNE FUNCTION

WP3: KNOWLEDGE TRANSFER and OUTREACH

AIM:
PROJECT FINDINGS DISSEMINATION AT VARIOUS LEVELS.

Task 1 - Innovation, advancement, and transfer of knowledge
Knowledge transfer will be directed to stakeholders, as aquaculture policy- makers, producers, suppliers, farmworkers.

Task 2 - Dissemination and Outreach
Specific dissemination activities will be oriented towards civil society and consumers, in line with EU vision towards Sustainable Development Goals.

HIGHLIGHTS ON ONGOING ACTIVITIES

- ✅ FIRST PRIMING EXPERIMENTS HAVE BEEN COMPLETED
- SOON WE ARE STARTING THE EXPERIMENTS TO TEST PRIMING EFFECTIVENESS TOWARDS MULTIPLE STRESSORS CHALLENGE

HOW CAN WE KEEP IN TOUCH?

Genomics Ecotoxicology & Microbiology in Marine Animals
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ECOTOXICOLOGY and ENVIRONMENTAL CHEMISTRY
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