Effects of plastics leachates on the larvae settlement of *Crassostrea gigas* in a multiple stressor environment

Grandjean Juliette[1,2], Kazour Maria[2], Sawan Rosa[2], Amara Rachid[2], Nitschke Therese[1] and Catarino Ana Isabel[1]

[1] Ocean & Human Health division, Research department, Flanders Marine Institute (VLIZ), InnovOcean Campus, Jacobsenstraat 1, 8400 Oostende, Belgium /VLIZ
E-mail: juliette.grandjean@etu.univ-littoral.fr

[2] Laboratoire d'Océanologie et de Géosciences, UMR8187 / Université du Littoral Côte d'Opale, 28 Av. du Maréchal Foch, 62930 Wimereux, France

In 2022, global plastic production soared to 400 million tons, and a substantial portion of these plastics finds its way from inland areas to water systems, ultimately reaching coastlines through various entry points like rivers. Within aquatic environments, these plastics undergo physical degradation, propelled by factors such as UV radiation and mechanical processes, breaking down into microplastics (MPs; <5mm). The ingestion of these MPs by aquatic organisms, such as oysters, has been linked to adverse effects, including a reduction in the success of oyster larvae settlement which is a concerning issue for oyster production. With the climate change, these larvae face a mixed effects of microplastics and temperature fluctuations. To our knowledge, no studies have evaluated the impacts of these two stressors on the settlement success of *Crassostrea gigas'* larvae yet. Therefore, this study aims to assess the influence of a multi-stressor environment—specifically, increased water temperature and plastics leachates—on the settlement of *C. gigas'* larvae. First, Plastic items will be sampled from the Iser estuary in Nieuwpoort, Belgium, using an aquatic drone and a manta net in triplicate transects. Then, the polymeric composition of plastics in the water column will be identified to determine the most abundant polymer type. From the environmentally sampled plastic particles, leachates will be extracted for ecotoxicological assessments, allowing the investigation into the combined effects of microplastic leachates and increased temperature on pediveliger larvae (8 days post-fertilization) and their settlement. Four treatment conditions will be evaluated, each conducted simultaneously over a seven-day exposure period composed of 1 control group (C), 1 treatment with plastics leachates at control temperature (L), 1 treatment with an increased temperature of ± 3 °C (T), and the final treatment with the multiple stressors conditions involving the plastics leachates and a higher temperature of ± 3 °C (MSC). Ultimately, statistical tests will be employed to determine if the variables significantly impact the settlement of larvae and to clarify the potential correlations between the two variables. The anticipated outcome is a substantial reduction in the settlement success ratio of *C. gigas*' larvae when both microplastic leachates and elevated temperatures coexist in the environment, presenting a potential challenge for oyster farmers in the future.

Keywords
(Micro)plastic Leachates; Crassostrea Gigas; Larvae Settlement; Multiple Stressors