Abstracts of poster presentations

Biofouling and anti-fouling research @ILVO

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Marine biofouling causes serious problems for a wide range of maritime industries around the world, and in return, anti-fouling agents cause concern about their potential to negatively affect the marine ecosystem. The Institute for Agricultural and Fisheries Research (ILVO) is on one hand involved with sustainable aquaculture systems and efficiency of fisheries methods, and on the other hand with environmental quality and ecosystem health. The aim of this abstract is to present the skills available @ILVO to test biofouling formation on hard substrates, to provide insights on emerging contaminants in anti-fouling coatings in the marine environment and to develop alternative environmentally friendly antifouling agents.

Characterization of biofouling and its dynamics: from microfouling to macrofouling.

Microfouling involves the first steps in the biofouling process. As the process of biofilm formation is dynamic, primary colonizers (microbial communities) provide essential information on the fouling process and a microfouling assay is needed to understand the fouling mechanisms. @ILVO, microfouling formation is evaluated through DNA metabarcoding, which allows the taxonomic identification of the first species colonizing the surface, which are invisible by the eye at that stage. The methodology, based on 16S rDNA and ITS2 amplicon sequencing for bacterial and fungal communities' composition respectively, was originally developed @ILVO for biofouling assessment on plastic debris.

Macrofouling occurs in a next stage of the biofouling process, and involves the settlement and growth of higher organisms on underwater or intertidal surfaces. Methodology shifts as macrofouling characterisation can be done by stereomicroscopy. A group of taxonomic experts with many years of experience in morphological identification of hard and soft substrate species is resident @ILVO.

Determination of toxic antifouling agents and development of environmentally friendly alternatives.

An unfortunate drawback of antifouling still is the unavailability of environmentally safe and adequate alternatives to TBT. The industry remains forced to fall back on leaching extreme toxic biocides, all having their respective and often unknown severe sub-lethal effects. One example is the commercial application of up to 80% copper oxide (64% copper) coatings on ship hulls. ILVO has expertise in copper and zinc determinations in marine environments, in co-operation with CODA-CERVA. Recently, an analytical procedure has been developed @ILVO to determine a wide variety of toxic booster biocides at environmentally low concentrations. @ILVO, focus is also on research on environmentally friendly alternatives, hereby inspired by the fouling-free marine organisms. Numerous species of several phyla possess mechanisms to remain fouling-free during their whole lifetime and even thereafter. However, the complexity of the antifouling process, reflected by the many hundreds of described and structurally different chemical compounds all or not in combination with topographical properties slows down the search for safe and preferably natural antifoulants.