

18<sup>th</sup> International Conference on

# FOOD MICROBIOLOGY

April 27-28, 2023 | Rome, Italy

## Use of essential oils in the fight against antibiotic resistance from aquacultures

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**Introduction:** Aquaculture is one of the most promising food industries with drastically increasing pro capite fish/shellfish consumption. Intensive techniques and the growing use of sub-therapeutic doses of antibiotics, increase both the selective pressure on resistant bacteria and the transfer of mobile resistance genes into both the aquatic and terrestrial environment. Unfortunately, little has been done to identify alternative antimicrobial natural approaches in fish farms.

The aim of this research is to identify the effectiveness and the safety of both essential oils (EOs) and commercial formulations based on EOs (CF-EOs) to control the fishes' pathogenic bacteria growth and the development of their biofilms in aquacultures.

**Methods:** The antibacterial efficacy of eleven EOs and two CF-EOs was tested against nine ATCC and

seven bacteria belonging to fish farms. Chemical analysis of both EOs and CF-EOs was achieved by GC-MS analysis. MIC and MBC values were obtained using broth micro-dilution tests according to EUCAST guidelines. The efficacy on biofilm disruption was evaluated with both conventional in vitro investigations and live and dead staining performed on biofilms grown directly on crustacean carapace. Finally, in vivo models of zebrafish embryos were used to evaluate the safety of the most active EOs and CF-EOs.

**Results:** The data show that concentrations lower than 0.05% v/v of EO and CF-EO, properly delivered, are safe and able to modulate the growth of pathogenic bacterial strains and their biofilms.

**Conclusion:** This paves the way for green treatments in the one health prevention of fish epidemics.

### Biography

Mattia Di Mercurio graduated a master degree in food and science technologies, with a nutrition dissertation on "Human genetic polymorphisms influencing bioavailability and metabolism of plant phenolic compounds: a systematic review of the literature" at Parma University. Currently is a PhD student at Cattolic University of Sacred Heart in the microbiology department: his research line is based on the use of essential oils in the treatment of animal diseases, focusing on intensive fish farms.

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