Effect of TDA-producing Phaeobacter inhibens on the fish pathogen Vibrio anguillarum in non-axenic algae and copepod systems

The expanding aquaculture industry plays an important role in feeding the growing human population and with the expansion, sustainable bacterial disease control, such as probiotics, becomes increasingly important. Tropodithietic acid (TDA)-producing Phaeobacter spp. can protect live feed, for example rotifers and Artemia as well as larvae of turbot and cod against pathogenic vibrios. Here, we show that the emerging live feed, copepods, is unaffected by colonization of the fish pathogen Vibrio anguillarum, making them potential infection vectors. However, TDA-producing Phaeobacter inhibens was able to significantly inhibit V. anguillarum in non-axenic cultures of copepod Acartia tonsa and the copepod feed Rhodomonas salina. Vibrio grew to 10^6 CFU ml⁻¹ and 10^7 CFU ml⁻¹ in copepod and R. salina cultures, respectively. However, vibrio counts remained at the inoculum level (10^4 CFU ml⁻¹) when P. inhibens was also added. We further developed a semi-strain-specific qPCR for V. anguillarum to detect and quantify the pathogen in non-axenic systems. In conclusion, P. inhibens efficiently inhibits the fish larval pathogen V. anguillarum in the emerging live feed, copepods, supporting its use as a probiotic in aquaculture. Furthermore, qPCR provides an effective method for detecting vibrio pathogens in complex non-axenic live feed systems.

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