Isolation of TDA-producing Phaeobacter strains from sea bass larval rearing units and their probiotic effect against pathogenic Vibrio spp. in Artemia cultures

Fish-pathogenic Vibrio can cause large-scale crashes in marine larval rearing units and, since the use of antibiotics can result in bacterial antibiotic resistance, new strategies for disease prevention are needed. Roseobacter-clade bacteria from turbot larval rearing facilities can antagonize Vibrio anguillarum and reduce mortality in V. anguillarum-infected cod and turbot larvae. In this study, it was demonstrated that antagonistic Roseobacter-clade bacteria could be isolated from sea bass larval rearing units. In addition, it was shown that they not only antagonized V. anguillarum but also V. harveyi, which is the major bacterial pathogen in crustaceans and Mediterranean sea bass larvae cultures. Concomitantly, they significantly improved survival of V. harveyi-infected brine shrimp. 16S rRNA gene sequence homology identified the antagonists as Phaeobacter sp., and in silico DNA-DNA hybridization indicated that they could belong to a new species. The genomes contained genes involved in synthesis of the antibacterial compound tropodithietic acid (TDA), and its production was confirmed by UHPLC-TOFMS. The new Phaeobacter colonized live feed (Artemia) cultures and reduced Vibrio counts significantly, since they reached only $10^4$ CFU mL$^{-1}$, as opposed to $10^8$ CFU mL$^{-1}$ in non-Phaeobacter treated controls. Survival of V. anguillarum-challenged Artemia nauplii was enhanced by the presence of wild type Phaeobacter compared to challenged control cultures (89±1.0% vs 8±3.2%). In conclusion, TDA-producing Phaeobacter isolated from Mediterranean marine larviculture are promising probiotic bacteria against pathogenic Vibrio in crustacean live-feed cultures for marine fish larvae.

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