Bioremediation of fish farm waste by deposit-feeding polychaetes *Capitella* sp. and *Hediste diversicolor*

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Integrated multi-trophic aquaculture systems (IMTA) combine species from different trophic levels to optimize nutrient recycling (Chopin et al. 2006). Studies have demonstrated the interest of adding deposit-feeders to improve sediment quality under floating fish cages (ex, Katz et al. 2002, Heilskov et al. 2006). The various sediment activities of deposit-feeders - feeding and bioturbation- enhance organic matter mineralisation and recycling and maintain toxic metabolites to sub-toxic levels. Our objective was to test effects of two deposit-feeder polychaetes, *Hediste diversicolor* and *Capitella* sp. on the bioremediation of seabass waste with potential application in recirculating multi-trophic aquaculture system (RAS-IMTA)

In 24 mesocosms (370 cm^2, 7 cm layer), *Hediste* (300 ind. m^{-2} and *Capitella* (18000 ind. m^{-2}) were raised individually or in mixture (HC). 2 types of sediment were tested (grain size F<0.5mm and S<0.8mm). Accumulated water nutrient concentrations were analysed.

Fine Sand (F) Sand (S)

Capitella sp (C) *Hediste diversicolor (H)* *Mixture of HC*

In 40l mecosoms, fish waste assimilation by *Hediste diversicolor* was tested through stable isotope analysis. 2 types of feed were tested, feed1 (carp feed) and feed2 (seabass faeces and feed).

Mesocoms to test fish waste assimilation by Hediste diversicolor

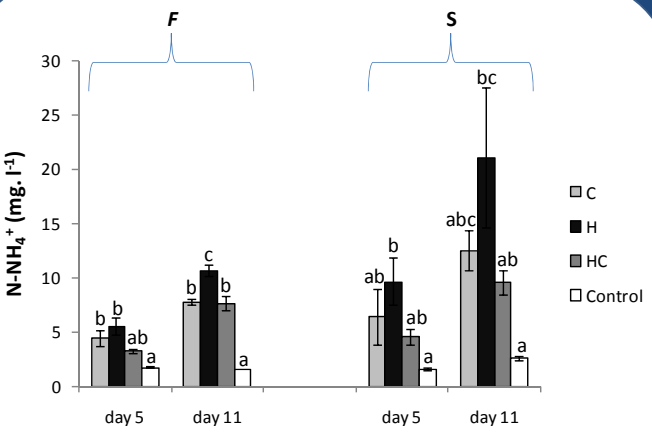

Fig.1 Accumulated concentration in $mg.l^{-1}$ of $N\text{-}NH^{4+}$, (average ± SE, n =3) overlaying water containing fine-sand (F, left) and sand (S, right): Control- without polychaetes, C- *Capitella capitata*, H- *Hediste diversicolor*, HC- combinaison of *Capitella* and *Hediste*.

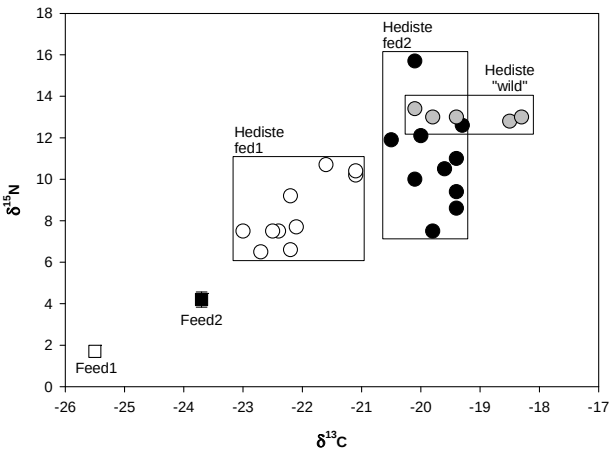

Fig.2 Variation in isotopic composition ($\delta^{15}N$, $\delta^{13}C$) of *Hediste diversicolor* collected in the wild ○ and after 30 days fed in aquarium with feed1○ and feed 2●

Discussion: The present study confirmed the interest of using polychaetes to reduce and valorize OM fish waste. Higher effect of *Hediste diversicolor* mococulture was explained by "Hediste density effect" (Ieno et al 2006). Assimilation of fish farm waste by *H. diversicolor* was confirmed through stable isotope analysis. As deposit-feeders enhance OM mineralisation, the nutrient-rich water could be used as fertilizer in a algal compartment in a RAS-IMTA system.

References: Chopin T (2006) AQUA 2006, 9-13 May, Firenze; Heilskov AC et al. (2006) JEMBE 339:204-225; Ieno EN et al.(2006) MEPS 311:263-271; Katz T et al.(2002) MEPS 234:205-214