Fate of microphytobenthos and bacterial biofilm production : export through fishes macroconsumers (*Liza aurata*)

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Context

Mullets are benthivorous fish extremely abundant and widespread in marine coastal systems. Mullets are thought to exploit benthic microbial resources (i.e., microalgae and bacteria) but it is still unclear to which extent this trophic link structures both energy and material fluxes in marine coastal environments.
The poor understanding of the trophic role of mullets stems largely from the difficulties with assessing their grazing pressure. The use of stable isotopes on pre-labelled microalgae and bacteria has been recently applied to estimate the uptakes by benthic invertebrates (Pascal et al., 2008). By using a similar approach, we investigate the trophic link between microbial assemblages and mullets.
Another limitation stems from the difficulties in carrying out experimental manipulations of fish both in the field and in laboratory conditions without inducing stress in fish or altering their behavior. The mesocosm is a useful tool to track the feeding behavior of mullets since its settings minimize the stress due to manipulation of fish.

Aims

The particular objectives of my activities are:
(a) to estimate the feeding pressure and foraging behaviour of the golden grey mullet *Liza aurata*,
(b) to quantify the algal and bacterial uptake of *L. aurata*,
(c) to evaluate the disturbance of foraging on the algal spatial distribution.
Any details of the objectives, the experimental set-up, response variables and results of each activity are listed in table 1.

Reference

Pascal P-Y., Dupuy C., Mallet C., Richard P., Niquil N. (2008). Bacterivory by benthic organisms in sediment: Quantification using 15N-enriched bacteria. Journal of Experimental Marine Biology and Ecology. 355: 18–26

Table 1. Summary of the activities done within the Task 4 -Workpackage 1 of VASIREMI project. The objectives, the experimental set-up, response variables and results are reported for each study. Notes: [A] Temp. = Temperature (°C); [B] Weight = Average values of fish weight (gr); [C] SL = Average values of fish standard length (cm); [D] SL = Average values of fish mouth width (cm);

Study			Objectives	Experimental set-up		Response variables	Results/Expected Results
(a)	Feeding pressure and foraging behavior		The analyses of the feeding traces (FT) in terms of number of FT done per individual, time spent per FT, and area covered by FT	Temp.[A] : 20°C and 10°C Young: Weight [B] : 7.0 gr SL [C]: 9.7 cm MW[D]: 0.6 cm Medium size: Weight [B] : 32.3 gr SL [C]: 16.0 cm MW[D]: 0.9 cm	Mesocosm 3 individuals + Video tracking system Video analyses	Number of feeding traces (FT-n ind^{-1} exp. $time^{-1}$) Feeding time (FT-time ind^{-1} exp. $time^{-1}$) Grazed area (FT-cm^2 ind^{-1} exp. $time^{-1}$)	Video analyses in progress
(b)	Uptake						
	(i)	Digestive physiology	Gasto-intestinal passage time of ingested biofilm	Temp.[A] : 20°C Weight [B] : 21.0 gr SL [C]: 14 cm	Aquaria (25 L)	Organic matter ($\mu g\ g\ sed^{-1}$)	The excretion of ingested material occurred after 4 hours from ingestion
	(ii)	Ingestion rate	The amount of the ingested algae and bacteria per unit of time	Temp.[A] : 20°C and 10°C Young: Weight [B] : 7.5 gr SL [C]: 9.8 cm MW[D]: 0.6 cm Medium size: Weight [B] : 32.7 gr SL [C]: 16.0 cm MW[D]: 1.2 cm	Mesocosm 6 individuals + Dual labeling approach: ^{13}C enriched algae and ^{15}N enriched bacteria	$\mu g\ C_{algae}$ or $C_{bacteria}\ ind^{-1}$ $grazing\ time^{-1}$	Data analyses in progress
(c)	Foraging disturbance		The analyses of grazing on the algal spatial distribution	Temp.[A] : 20°C and 10°C Young: Weight [B] : 7.5 gr SL [C]: 9.8 cm MW[D]: 0.6 cm	Mesocosm 3 individuals + Clho-a content ($\mu g\ g\ sed^{-1}$) Analyses of variance components	Variance component of algal distribution	At the highest temperature, grazing increased the smallest scale spatial variance of microphytobenthos spatial scale