

## **Carbon amendment stimulates benthic nitrogen cycling during the bioremediation of particulate aquaculture waste**

### **General comments:**

- Good manuscript, highly relevant to understand the fate of metabolic wastes from aquaculture in shallow aquatic systems.
- The manuscript is well structured:
  - The introduction explains well why the hypothesis that increasing the molar C:N ratio of particulate waste from 5 to 20 might promote ammonium assimilation into heterotrophic bacteria is investigated.
  - The material and methods section gives sufficient detail on the set-up of the experimental chambers, the samples collected and the analyses performed, except where C:N ratios are explained (see first major comment).
  - The results section is clearly written and tables and figures are informative (except for giving no information on significant differences between factors/treatments). The latter is taken care of by presenting in-text statistic metrics.
  - The discussion and conclusions are focused around own results and placed in context of existing literature.

### **Major comments:**

- Lines 112 – 115: the amounts of aquaculture waste added daily to the incubation chambers are given as '26.8 mg day<sup>-1</sup> wet weight'. It is not clear if this amount refers to aquaculture waste or to carbon. If it refers to carbon, then it cannot be 'wet weight'. Please clarify.
  - In line 145, it is stated that 400 mmol C/m<sup>2</sup>/day is added to the incubation chambers. Considering the chambers have an inner diameter of 8.4 cm (Line 119), then about 26.6 mg C/incubation chamber/day is added. This carbon represents dry weight. Please make statements in lines 112-115 and line 145 to concur.
  - Line 114: 'Of soluble starch 7.5 mg DM is added daily'. Here too, it is not clear if this refers to starch or to carbon in starch. Please clarify.
  - Even if above refers to carbon in starch, then the amount is too small to raise the C:N ratio from 5 to 20, assuming the fish waste contains 400 mmol C/m<sup>2</sup>/day and 80 mmol N/m<sup>2</sup>/d (= C:N ratio 5). Adding 7.5 mg C per chamber, concurs with 113 mmol C/m<sup>2</sup>/d. The C:N ratio of the combined fish waste & starch then becomes 6.4. Please clarify.
- Lines 370 – 373: The information that the sea cucumbers lost weight is useful, but comparing to the final weight obtained in similar conditions in another experiment, without giving details on nutrient loading, is not useful. If additional information is given it should give insight why or how the animals lost weight.

### **Minor comments:**

- line 84: Start sentence with: The molar C:N ratio...
- whole manuscript: when listing cited references in the text, in some cases, the author names should be written outside the brackets.
- Line 154: a standard deviation is given extrapolating the stocking density from 3 animals per chamber to 541 animals per m<sup>2</sup>. This cannot be correct.

- Lines 162 and 163: delete ‘approximately two hours’. The duration ranges of incubations are given in paragraph lines 183-190.
- Lines 215-216: remove hard return at end of line 215.
- Line 464: delete ‘or’.
- Line 466: not clear why a reference is given on an observation of own data?