Trophic and specific diversity of harpacticoid copepods associated to *Posidonia oceanica* macrophytodetritus

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Introduction

Mediterranean *Posidonia oceanica* meadows produce large amounts of dead seagrass detritus that accumulate on bare bottom sand. These macrophytodetritus are of low nutritional quality but are massively colonised by bacteria, fungi, diatoms, meio- (38µm-1mm) and macrofauna (>1mm).
It is assumed that those associated communities enrich the detritus and play an important role in the energy transfer to higher trophic levels.
Two **research questions** are put forward:

(1) Do macrophytodetritus in different sites differ in isotopic signature and thus in origin over a year?

(2) Do different harpacticoid copepods (Crustacea, Copepoda) feed on different food sources? i.e. living seagrass, seagrass detritus, bulk epiphytic biofilm or other carbon sources.

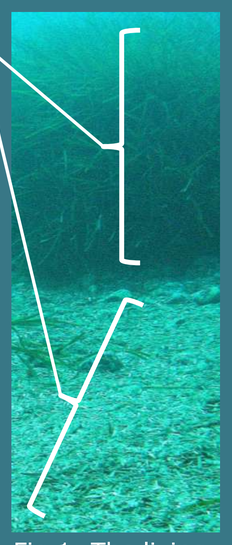

Fig.1: The living seagrass and the dead detritus covering the bottom

Methods

Fig.2: Sampling sites in the Bay of Calvi, Corsica

In the Bay of Calvi (NW Corsica), two sampling sites were sampled at a depth of 10 m by SCUBA diving in 2011.

Different potential food sources and harpacticoid copepod were sampled during four seasons.

The samples were dried and grind for isotopic measurements with a mass spectrometer (Isoprime IRMS) coupled to an element analyzer (Elementar VarioMicro). Samples for the $\delta^{13}C$ measurements were acidified prior to analysis to remove any carbonates.

Results

1. Seasonal variation of macrophytodetritus

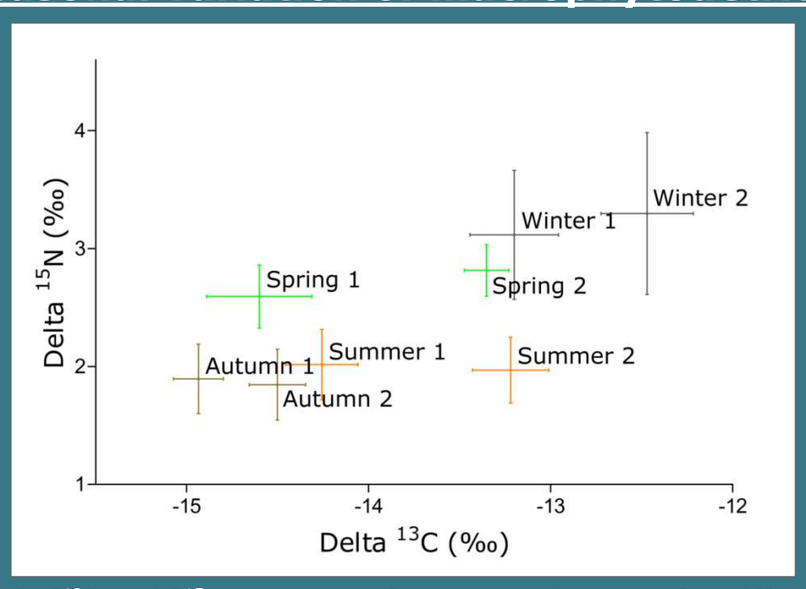

Fig. 3: $\delta^{13}C$ and $\delta^{15}N$ signatures of macrophytodetritus in four different seasons: winter (February), spring (May), summer (August) and Autumn (October) . Sampling sites (see fig. 2) are indicated by 1 and 2.

The stable isotope values for the macrophytodetritus differed significantly between the two sampling sites [two-way ANOVA, $p<0.001$] while the seasons were not significantly different [two-way ANOVA, $p=0.399$] although winter and autumn samples were plotted far from each other. The highest variance was found for the carbon values in winter

2. Use of sources by copepods

Cop A='Motile' Tisbidae sp.

Cop B='Motile' Thalestridae sp.

Cop C='Epiphytic' Tegastidae sp.

Cop D='Epiphytic' Porcellidiidae sp.

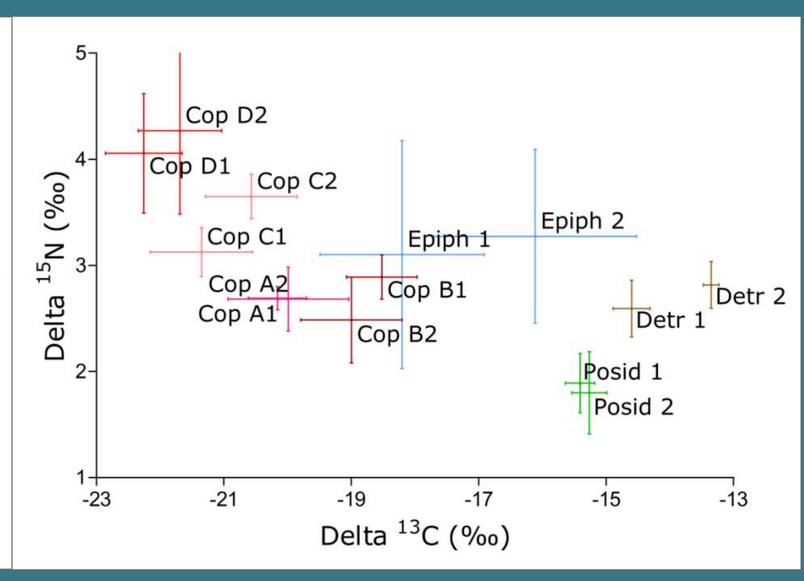

Fig. 4: $\delta^{13}C$ and $\delta^{15}N$ signatures of potential food sources and 4 copepod families, all sampled in spring (May 2011). Sampling sites (see fig. 2) are indicated by 1 and 2.
Abbreviations are: Posid.=living seagrass; Detr.=dead seagrass; Cop.=copepod.

Within the food sources (plotted to the right), the degradation process makes the detritus less depleted in carbon and more enriched in nitrogen, resulting into a strong contrast with living seagrass leaves ('Posid'). The previously reported niche segregation in terms of habitat use by the copepods was found to be reflected in a trophic segregation. The more 'motile' copepods occupied another trophic niche than the families Tegastidae and Porcellidiidae known as 'epiphytic' copepods.

Conclusions

The isotopic signatures of phytodetritus differed both spatially and temporally (not significant). This implies that they originate from different meadows not adjacent to the sampled sand patch.

Signatures of the epiphytes bulk showed a wide variation. It is therefore hard to draw any conclusions in terms of their use as food source by harpacticoid copepods. Living seagrass and detritus can be ruled out here as potential food source

Among the harpacticoid copepod families included in the present study, a clear trophic segregation was found. The truly 'epiphytic' families did not overlap with the more 'motile' families.

In conclusion, the seagrass ecosystem showed to be very niche-specific both in terms of food sources and consumers.

Acknowledgements

The authors warmly thank the Stareso field station staff for their support during the sampling campaign. The first author acknowledges a PhD F.R.I.A. grant (Fund for Research Training in industry and in agriculture) of the Belgian National Fund for Scientific Research (FRS-FNRS). This study was conducted within the frame of FRS-FNRS research project FRFC 2.4511.09 (University of Liège) with additional support provided by the Ghent University (BOF-GOA 01GA1911W). G. Lepoint is a Research Associate of the FRS-FNRS. M. De Troch is a postdoctoral fellow financed by the Special Research Fund of the Ghent University.

The 8th International Conference on
Applications of Stable Isotope techniques to Ecological Studies
ISOECOL, August 2012, Brest, France