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A comparative analysis of benthic nematode assemblages from *Zostera noltii* beds before and after a major vegetation collapse

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ABSTRACT

Benthic nematodes are widely regarded as very suitable organisms to monitor potential ecological effects of natural and anthropogenic disturbances in aquatic ecosystems. During 2008, the seagrass beds of *Zostera noltii* located in the Mira estuary (SW Portugal) disappeared completely. However, during 2009, slight symptoms of natural recovery were observed, a process which has since evolved intermittently. This study aims to investigate changes in patterns of nematode density, diversity, and trophic composition between two distinct habitat conditions: "before" the collapse of seagrass beds, and during the early recovery "after" the seagrass habitat loss, through the analysis of: i) temporal and spatial distribution patterns of nematode communities, and ii) the most important environmental variables influencing the nematode assemblages. The following hypotheses were tested: i) there would be differences in nematode assemblage density, biodiversity and trophic composition during both ecological conditions, "before" and "after"; and ii) there would be differences in nematode assemblage density, biodiversity and trophic composition at different sampling occasions during both ecological conditions. Nematode density and diversity were significantly different between the two ecological situations. A higher density was recorded before, but a higher diversity was evident after the collapse of *Z. noltii*. In spite of the disturbance caused by the seagrass habitat loss in the Mira estuary, the nematode trophic composition did not significantly differ between the before and after seagrass collapse situations. Despite the significant differences found among sampling occasions, a consistent temporal pattern was not evident. The response of nematode communities following this extreme event exhibited considerable resistance and resilience to the new environmental conditions.

1. Introduction

Benthic nematodes provide valuable information regarding ecosystem health (Sheppard, 2006). Sediment structure, chemistry, disturbance and availability of food, such as bacteria and microphytobenthos, are closely linked to nematode assemblage composition and distribution patterns (Giere, 1993; Heip et al., 1985; Moens et al., 2005), through the changes in density, diversity, structure and functioning (Danovaro et al., 2008; Norling et al., 2007; Patrício et al., 2012). Furthermore, several studies have highlighted the importance of the link between nematode diversity and ecosystem functioning, which may be important in the assessment of estuarine and marine biological integrity (Coull and Chandler, 1992; Danovaro et al., 2008; Fonseca et al., 2011; Moreno et al., 2008; Schratzberger et al., 2004; Steyaert et al., 2007).

Seagrass beds provide habitat for ecological communities and enhance biodiversity through their facilitative effects on associated species (Ellison et al., 2005), acting as ecosystem engineers by structuring pelagic and benthic assemblages (Bos et al., 2007). Seagrass beds are important in primary production, nutrient cycling, sediment and nutrient trapping, sediment stabilization, and their structural complexity is critical for the animals which live in them (Boström and Bonsdorff, 1997; Orth et al., 2006). Several studies that analysed the meiobenthic communities associated with seagrass beds have concluded that meiofauna in vegetated

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