EFFECTS OF ISOPOD GRAZING: AN EXPERIMENTAL COMPARISON IN TEMPERATE (IDOTEA BALTHICA, BALTIC SEA, FINLAND) AND SUBTROPICAL (ERICHSONELLA ATTENUATA, GULF OF MEXICO, U.S.A.) ECOSYSTEMS

BY

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ABSTRACT

The intensity of isopod grazing was compared between temperate Baltic Sea (60°N, Finland) and subtropical Gulf of Mexico (30°N, U.S.A.) species assemblages. In laboratory consumption experiments, Idotea balthica (Finland) and Erichsonella attenuata (U.S.A.) were offered separately: epiphytes on artificial blades, and the three dominant species of submerged aquatic vegetation (SAV) in both study areas, i.e., Zostera marina, Ruppia maritima, Potamogeton pectinatus in Finland, and Thalassia testudinum, Ruppia maritima, Halodule wrightii in the U.S.A. Isopod consumption rates of SAV varied greatly in both regions, but mean consumption rates were higher in the U.S.A. than in Finland. In Finland, isopod consumption of epiphytes on artificial blades was clearly higher than feeding on live seagrasses, while the opposite was found to be true in parallel experiments conducted in the U.S.A. The calculated impact of isopods on the net above-ground primary production (mg dw · m⁻² · d⁻¹) of Z. marina and T. testudinum, yielded leaf losses between 2 and 15% (I. balthica) and of 7-30% (E. attenuata), respectively.

RÉSUMÉ

L’intensité de broutage des isopodes a été comparée entre les assemblages d’espèces de la mer Baltique (60°N, Finlande) et du Golfe du Mexique subtropical (30°N, U.S.A.). Au cours des expérimentations au laboratoire, des épiphytes sur substrat artificiel ainsi que les trois espèces dominantes de végétation aquatique submergée (SAV) des zones d’étude ont été proposées séparément aux isopodes Idotea balthica (Finlande) et Erichsonella attenuata (U.S.A.), soit Zostera marina, Ruppia maritima, Potamogeton pectinatus en Finlande, et Thalassia testudinum, Ruppia maritima, Halodule wrightii aux U.S.A. Les taux de consommation de SAV des isopodes ont varié de façon...
important dans les deux régions, mais les taux moyens de consommation étaient plus élevés aux U.S.A. qu’en Finlande. En Finlande, la consommation d’épiphytes sur substrat artificiel des isopodes était nettement plus élevée que la nourriture sur les plantes vivantes, tandis que l’opposé a été trouvé lors d’expérimentations parallèles menées aux U.S.A. L’impact calculé des isopodes sur la production primaire nette (mg dw $m^{-2}.d^{-1}$) de *Z. marina* et *T. testudinum*, a permis d’évaluer les pertes en feuille à, entre 2 et 15% (*I. balthica*) et 7-30% (*E. attenuata*), respectivement.

**INTRODUCTION**

Submerged aquatic vegetation (SAV) provides the basis for benthic food chains and hosts diverse assemblages of invertebrates and fish in many coastal areas (Verhoeven & Van Vierssen, 1978; Kantrud, 1990, 1991; Dennison et al., 1993). However, the functional importance of individual herbivore species in SAV systems remains inadequately understood, and examples of consumption of brackish water SAV such as *Potamogeton* spp. and *Ruppia* spp. by mesograzers (animals <2.5 cm, Jernakoff et al., 1996) are scarce, although these genera share many ecological functions with fully marine angiosperms (Den Hartog, 1981). In many SAV systems, isopods are among the most important herbivores (Kensley et al., 1995; Jernakoff et al., 1996; Duffy et al., 2001).

In the Baltic Sea, *Idotea* spp. are the numerically most important mesograzers with potential to remove seagrass tissue and epiphytes. *Idotea* spp. are mainly found in *Fucus vesiculosus* L. belts (Hemmi & Jormalainen, 2002), but also in SAV dominated by mixed and/or monospecific stands of *Ruppia maritima* L., *Potamogeton pectinatus* L., and *Zostera marina* L. (cf. Boström & Bonsdorff, 2000). However, despite *Idotea* spp.’s well known potential to control macroalgal populations in this area (Kangas et al., 1982; Salemaa, 1987; Schaffelke et al., 1995; Engkvist et al., 2000; Worm et al., 2000), no quantitative data on the role of *Idotea* spp. as consumers of SAV in the Baltic Sea are available.

The distribution in the U.S.A. of the isopod, *Erichsonella attenuata* (Harger, 1873), extends from the western Atlantic to the Gulf of Mexico. In the northern Gulf of Mexico, *E. attenuata* is common in SAV habitats dominated by *R. maritima*, *Halodule wrightii* Asch. and *Thalassia testudinum* Banks & Sol. ex K.D. Koenig. In SAV systems of the Indian River Lagoon, Florida, *E. attenuata* is one of the numerically most important invertebrate species (Kensley et al., 1995). However, individual consumption values of *Erichsonella* spp. on these seagrasses are lacking. Due to taxonomical and morphological similarities, and a similar herbivorous role of *I. balthica*, respectively, *E. attenuata*, we assumed that these species are functionally comparable in their respective systems.

In a previous study, we showed how the behaviour of the isopods, *Idotea balthica* (Pallas, 1772) and *Erichsonella attenuata*, changes in relation to food quality,