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Aquatic macrophytes as microhabitats of *Radix auricularia* (Gastropoda: Pulmonata): A case study from Southeast Bulgaria

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Abstract. The aim of the current study is to investigate the abundance of the freshwater pulmonate snail *Radix auricularia* among different aquatic plants communities, with the view of understanding if there is any particular habitat preference, comparing two freshwater basins having similar environmental conditions. The freshwater plant species were collected by net from two ponds at the end of May 2009 - 650 g wet plant mass, micro dam at Chernoochene Village, East Rhodopes Mts.; 138 g wet plant mass, small flood pond near the Maritza River, Plovdiv City, Upper Thracian Lowland. The plant mass was weighted in the laboratory after the alive snails were collected from the plant surface. Totally three species of freshwater plants were inhabited by *R. auricularia*, but its abundance and possible preference was highest on the Rigid Hornworth (*Ceratophyllum demersum*).

Key words: *Radix auricularia*, freshwater, macrophytes, habitats, ponds, South Bulgaria.

Introduction

Aquatic macrophytes are well known as preferred shelter and feeding sites of the freshwater snails (ZHADIN, 1952). Submerged macrophyte biomass is shown to be the key factor affecting species' number, density, and biomass of gastropods in standing waters (WANG *et al*., 2006). As follows the macrophytes could be determined as microhabitats which have very important role in aquatic habitats for the natural vitality of the epiphytic malacofauna.

Even though the Bulgarian freshwater mollusk fauna is relatively well studied in zoological aspect (ANGELOV, 2000) the ecology of the aquatic snails remains still poorly known (HUBENOV, 2005). The aim of the current study was to investigate the abundance of the freshwater pulmonate

snail *Radix auricularia* among different aquatic plants communities, with the view of understanding if there is any particular habitat preference, comparing two freshwater basins having similar environmental conditions.

Material and methods

The freshwater plant species were collected by net from two ponds at the end of May 2009 - 650 g wet plant mass, micro dam at Chernoochene Village, East Rhodopes Mts.; 138 g wet plant mass, small flood pond near the Maritza River, Plovdiv City, Upper Thracian Lowland.

The plant mass was weighted in the laboratory after the alive snails were collected from the plant surface. All gastropods were counted and identified in the laboratory mainly using GLÖER & MEIER-BROOK (2003), and a reference collection. The abundance of the snails was evaluated according to 10 g wet plant mass.

The habitat preference was evaluated using the formula of WILLIAMS & MARSHALL (1938) (after KREBS, 1994):

$$w_i = o_i / p_i,$$

where o_i is the proportion of *R. auricularia* specimens found on a given aquatic plant species against all individuals found on the collected plants, and p_i – the proportion of the weight of the plant species according all the weight of plants gathered from the pond. The habitat preference index was calculated for each of the two water basins, comparing two aquatic macrophyte species.

Results and Discussion

Totally three species of freshwater plants were inhabited by *R. auricularia* in the studied area: *Myriophyllum spicatum* (350 g, Chernoochene Village), *Ceratophyllum demersum* (300 g, Chernoochene Village; 107 g, Maritza River) and *Elodea canadensis* (31 g, Maritza River).

In the micro dam of Chernoochene Village abundance of *R. auricularia* considering the plant weight was: 0.09 individuals (i) per 10 g of *M. spicatum* (3 specimens found in 350 g wet plant mass), and 0.37i/10g of *C. demersum* respectively (11 specimens found in 300 g wet plant mass). Accordingly we estimated higher preference of the snails for inhabiting Rigid Hornworth (w_i = 1.7) than the *Myriophyllum* communities (w_i = 0.3) (Fig. 2).

At Maritza River flood ponds abundance of the snails was again higher on *C. demersum* (26 specimens in 107 g plant mass, 2.43i/10g), compared to *E. canadensis* (2 specimens in 31 g plant mass, 0.65i/10g) (Fig. 1). The preference index was again with higher value for Rigid Hornworth (w_i = 1.2) compared to the *Elodea* community (w_i = 0.3).

These very similar results when comparing two totally independent ponds showed a possible strong "preference" of *R. auricularia* to the Rigid Hornworth communities. This fact is probably due to the specific morphology of *C. demersum* ensuring most favorable shelter from snail predators when having rough and dense leafs being best refugees and hiding sites.

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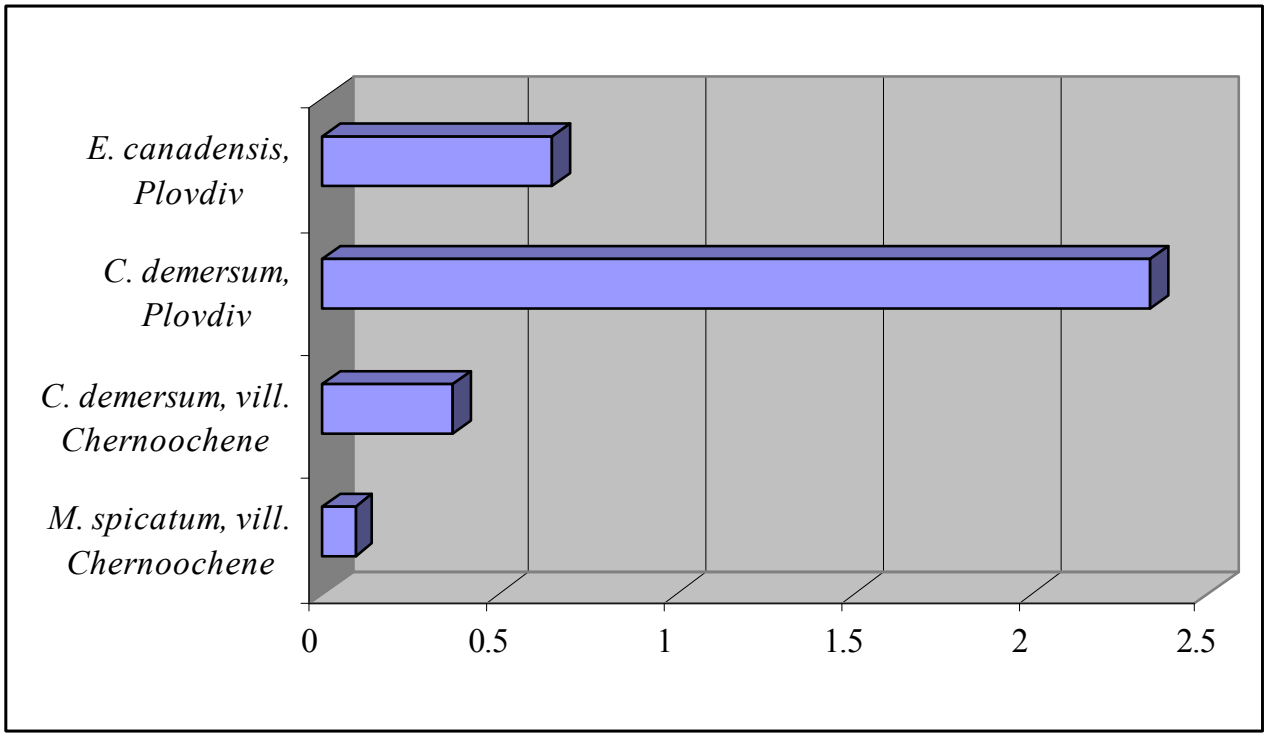

Fig. 1. Abundance of *Radix auricularia* in the two studied ponds, represented as individuals per 10 g wet plant mass from three different species.

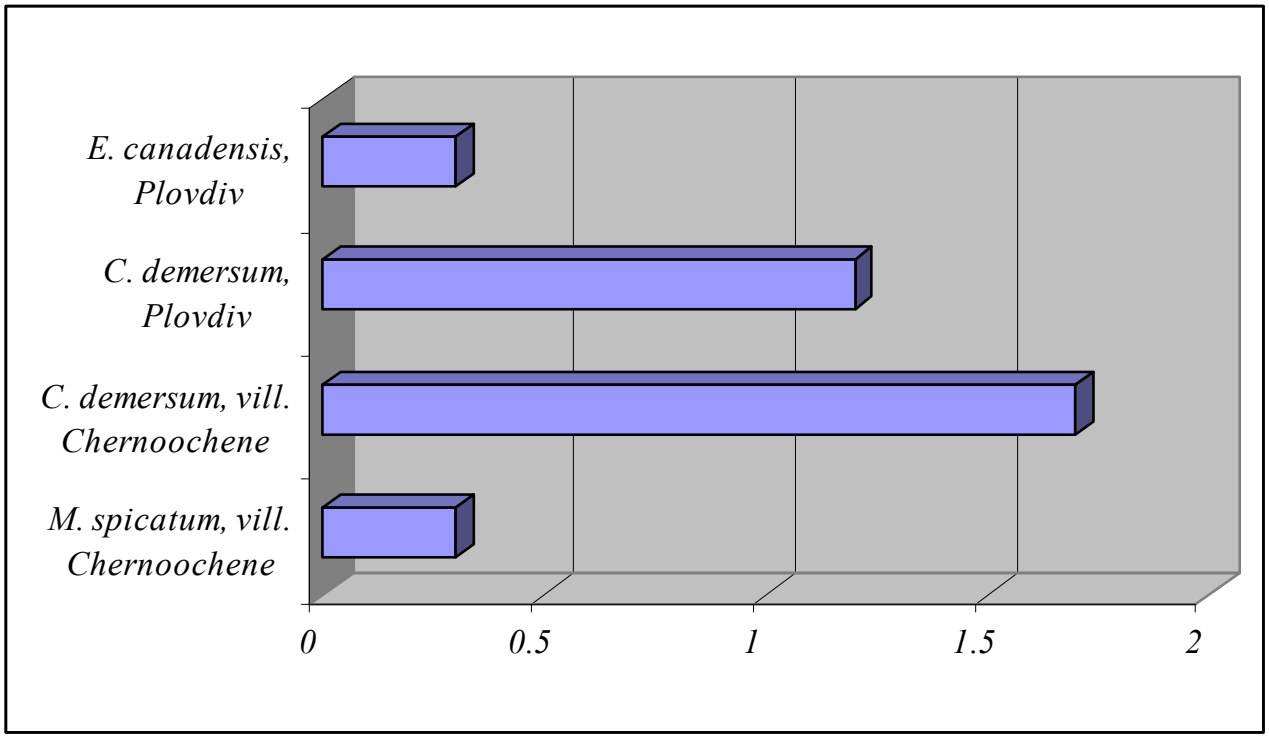

Fig. 2. Preference of *Radix auricularia* in two ponds under study, represented as Williams & Marshall's index for both studied ponds and the three aquatic plant species.

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Сладководните макрофити като микрохабитати на Radix auricularia (Gastropoda: Pulmonata): първоначално проучване от Югоизточна България

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Резюме. Целта на проучването е да се изследва числеността на сладководния вид *Radix auricularia* (Gastropoda: Pulmonata) върху няколко вида висши водни растения в два стоящи водоема, както и евентуалната му предпочитаемост към определено монодоминантно растително съобщество. Материалът е събиран в края на месец май, 2009 година. Общо три вида водни растения бяха идентифицирани като микро местообитания на *R. auricularia*, като неговата численост и вероятно силна предпочитаемост са най-високи върху роголистника (*Ceratophyllum demersum*).

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