POSIDONIA OCEANICA MIMICS AS AN EXPERIMENTAL TOOL TO STUDY COLONIZATION OF SEAGRASS EPIPHYTES. AN EXAMPLE ALONG A GRADIENT OF WATER ACIDIFICATION

Abstract - Mimics of Posidonia oceanica shoots are here described for the experimental study of epiphyte colonization in this plant. The mimic rhizome consists of a hollow cylinder made of earthenware (3 cm diameter × 13 cm length) and for the leaves, 4 stripes of flexible PVC (1 cm × 36 cm) of a dark green color and attached to a hooked iron stake. Preliminary results on epiphyte colonization in Posidonia meadows along a gradient of water acidification, confirm that mimics well reproduce the microclimatic conditions of the Posidonia shoots, with leaves showing a reduced diversity and higher patchiness than rhizome mimics, as observed in natural Posidonia shoots.

Key-words: Posidonia oceanica, epiphytes, mimics, CO₂ vents, water acidification, Tyrrhenian Sea.

Introduction - The epiphytes exert a central role in seagrass ecosystems for the functioning of their complex food web, involving many associated motile invertebrates and fish. Artificial structures to mimic seagrass morphology and architecture have scarcely been used in the Mediterranean Sea, and the few studies available refer to mimicking seagrass leaves to study diatom and foraminifer colonization (Mazzella et al., 1981; Ribes et al., 2000). Artificial structures can be useful to study and tease apart the so called “specificity” of epiphytes for their host seagrass species, respect to different, inert substrates (Mazzella et al., 1981). Mimics can also be a useful tool to study colonization and species interaction in time, as in the extensively used fouling panels, as well as to reduce the impact of shoot sampling on seagrass meadows. Artificial structures to mimic both the rhizome and the leaf morphology of Posidonia oceanica shoots are presented here as an experimental, and low impact tool to study colonization pattern of epiphytes in this seagrass species.

Materials and methods - Mimics of the rhizomes consist of hollow cylinders made of earthenware with a rough and finely grooved surface, to reproduce the roughness characterizing the natural rhizomes. Length of cylinders, set according to the rhizome mean height from literature data, was 13 cm, with a diameter of approx. 3 cm. A plastic label was tied on the cylinder’ rim (Fig. 1). Mimics of the Posidonia leaves were made with non toxic, dark green flexible PVC (IDROEVA ©, Pati s.p.a.); the material was cut in stripes 1 cm wide and 36 cm long. Four stripes (artificial leaves) were attached together with plastic straps to a hooked iron stake. The stakes with artificial leaves were then inserted in the hollow of the cylinder and fixed on the bottoms among Posidonia natural rhizomes, with low-impact for the system. The experiments were conducted in Posidonia oceanica meadows (2-3 m depth) around the Castello Aragonese (Island of Ischia, Italy) characterized by natural volcanic CO₂ vents which originate a gradient in pH values and water acidification (Hall-Spencer et al., 2008). Four Posidonia rhizome mimics and 6 artificial leaves were collected in 6 stations along the gradient (3 on the north and 3 on the south side of the Castello), at 3-month intervals. The % cover and abundance of organisms were calculated...
with the image analysing program Vidana 1.1. Here we present results of the first 3 months exposure (September-December 2009) on the south side of the study area.

![Image of P. oceanica mimic](image)

**Fig. 1 - A mimic of a *Posidonia oceanica* shoot used in this study.**

**Fascio di Posidonia oceanica artificiale utilizzato in questo studio.**

**Results and conclusions** - Artificial leaves, after 3 month exposure, were colonized almost exclusively by coralline algae (*Hydrolithon/Pneophyllum* spp., *Titanoderma* sp.), which strongly decreased in % cover under low pH conditions (from a mean of 18.7% in normal mean pH 8.12, to 0% at a mean pH 7.31), and filamentous green/brown algae, which on the contrary increased in low pH conditions (from 2.6% in normal to 87.4% in acidified conditions), and all leaves here showed clear signs of grazing by mollusks. Very few spirobids, hydroids and bryozoans (e.g., *Lichenopora* sp.) were also found on leaves. Mimics of Posidonia rhizomes hosted a higher variety and higher cover/abundance of organisms respect to the artificial leaves, mainly in the normal pH station. Coralline algae showed again a clear decrease in cover from normal (mean cover 31.7%) to acidified conditions (0%), while the green/brown filamentous algae increased from a mean 8.2% (normal) to 13.5% (acidified). The calcified serpulids (mean range 13-6.7 individuals × mimic) and spirobids (mean range 257-92 ind. × mimic) were present only under normal and mid pH conditions, as well as barnacles (*Balanus* spp., range 14.5-4.7 ind. × mimic), and at least 5 different species of bryozoans. These preliminary results confirm that mimics are reliable in reproducing the microclimatic conditions of the Posidonia shoots, with leaves showing a reduced diversity and higher patchiness than rhizome mimics, as observed in natural Posidonia shoots. They also are reliable to reproduce the pattern of epiphyte colonization along the pH gradient, since the pattern occurring in our artificial leaves is consistent with that observed in natural Posidonia leaves in a previous study on the south side of the same area (Martin *et al.*, 2008).

**References**


