SURVIVAL OF THE *POSIDONIA OCEANICA* CUTTINGS TRANSPLANTED INTO THE NORTHEASTERN LEVANT SEA

B. Celebi *, A.C. Gucu , M. Ok , S. Serdar , E. Akoglu
Institute of Marine Sciences, Middle East Technical University, Mersin 33731, Turkey - billur@ims.metu.edu.tr

Abstract
In the present study *Posidonia oceanica* shoots collected near from Bozyazı- Mersin are transplanted to 3 different sites along the south eastern coasts of Turkey, at 2 of which *Posidonia oceanica* meadows are not present naturally. The survival of transplants was followed from 2004 until recently. The success of the transplantation at the most eastern station, though the high seawater temperature, suggests that there may be combination of environmental reasons for the absence of *Posidonia oceanica* meadows in that area.
Keywords : Posidonia, Levantine Basin, Temperature.

Introduction
The distribution of endemic sea grass species *Posidonia oceanica* L. Delile is limited to the littoral zones of the Mediterranean and Marmara Seas [1]. Nevertheless along the eastern Mediterranean coasts of Turkey there are no *P. oceanica* meadows present and the northeastern boundary of meadows end in the Levant Sea, at 36° 09' N 33° 26' E [2]. The possible reason of this absence has been attributed to physical parameters of the seawater in that area such as high temperature [3]. The present study investigated the reason of absence of *P. oceanica* meadows along the northeastern Levant Sea by an experimental transplantation method, which is also being used for acceleration of recovery in damaged *P. oceanica* beds in western Mediterranean Sea.

Materials and Methods
P. oceanica shoots were collected either by SCUBA or free diving. Additionally some shoots from the by-catch of trawl surveys were used as cuttings to avoid serious impacts on donor *P.oceanica* meadows. Collection was made from 2 stations at various depths: at Turgutlar, where the most eastern boundary of meadows along the southern coasts of Turkey is present; and at Bozyazı, which is located near to the Kizilliman Marine Protected Area with healthy meadows. Afterwards cuttings were attached with nylon cable ties to the iron frames with grids made of nylon rope. Totally 21 frames with different coverage areas ranging from 0,49 to 2,25 m^2 were placed at 3 different stations in winter of 2004, in spring and autumn of 2005 and in spring of 2006. One of the stations was chosen only for control purpose at Bozyazıwhere the shoots were collected. The other two eastern stations, Erdemli and Samandag, were located outside the boundary where the *P. oceanica* meadows are naturally absent [Figure 1.].

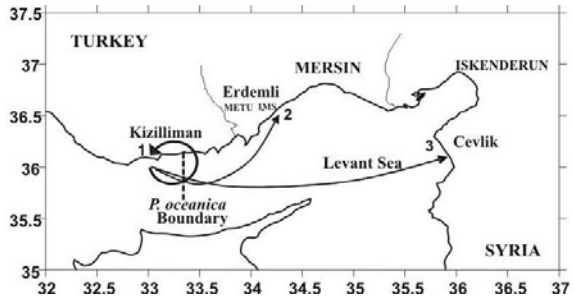

Fig. 1. Study area: Site number 1 is the only collection site, the all 3 sites are the transplantation sites.

Results
A few weeks after the first transplantation in 2004 at Samandag two frames were found broken on a commercial trawling boat. The cuttings of the next 2 frames transplanted at Erdemli in May 2005 were found dead after two months whereas the leaves of the cuttings on the third frame were alive but overgrazed. The secchi disc measurements at this station during these months ranged from 4 to 10 meters at 20 meter bottom depth. The sixth frame transplanted in August 2005 to the harbour of the Institute for visual observation of potential grazers was also overgrazed. The other 3 frames transplanted parallelly in autumn of 2005 to Bozyazıfor control purpose, Erdemli and Samandag were still alive in May 2006, January 2006 and October 2006, respectively. But leaves of transplants at Samandag were shortened due to grazing. Last 11 frames, transplanted to Samandag in May 2006 for increasing the coverage area of the last frame against the reduction by erosion of sediment, were still alive in October 2006.

Discussion
The study area is a unique site for *P. oceanica* transplantation experiments due its geographical position. The eastern Levant Sea is dominated by Levantine surface water mass whose most important features are high salinity and high temperature [4]. The area is also under the effect of pollution due to urbanization and high pressure of fishing by trawlers and purseiners. All of these parameters and activities have negative influence on the health of sea grass ecosystems. Destruction of first 2 grids by trawlers may indicate the significance of heavy trawling pressure on the sea bottom. As was repeatedly observed during visual inspections, grazing by herbivorous organisms seems to be an important factor in the absence of *P. oceanica* in the region. In addition to the only true herbivorous fish species of the Mediterranean fish fauna Lessepsian Siganids may pose a significant threat to the sea grass. Beside invasive fishes, some herbivorous exotic gastropod species e.g. *Conomurex persicus*, whose grazing activity may also have potential impacts on native ecosystem [5], have been observed in high concentrations around the frames. The water temperature over the shoots transplanted in Samandag exceeded the upper critical seawater temperature for *P. oceanica* growth suggested by Celebi et.al. (2006). On the other hand, despite relatively lower temperatures, the first 2 frames transplanted at Erdemli on May 2005 did not survive. The light penetration depth seems to be shallower in Erdemli compared to Samandag. However, the natural meadow in Turgutlar survives under even lower light condition than Erdemli. These three examples may indicate the combined effect of light penetration and temperature that may play synergistic role in the balance between respiration and photosynthesis of the *P.oceanica*. The long term effects of physical properties of the sea water on growth and production of *P. oceanica* shoots still need to be observed in following years by lepidochronological analysis of the transplants.
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