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Anatomical Features of *Posidonia Oceanica* (L.) Delile Growing in Turkey

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Introduction

Posidonia oceanica (L.) Delile is a widely distributed phanerogam in Aegean and Mediterranean Sea. The plant is classified in Magnoliophyta division, Posidoniaceae family. It is a robust perennial, hydrophytic herb with branched, adventious roots. The roots are without hair. Monopodially branched cylindrical rhizomes are covered with persistent fibrous remains of old leaf sheaths. Leaves are simple, distichous, linear. Flowers are naked in inflorescences; actinomorphic, hermaphrodite. The terminal inflorescence unit cymose or racemose clusters of spike. Fruit is with spongy pericarp [1-3].

The plant plays a dominant role in coastal ecosystem dynamics such as stabilizing the sea floor with its roots. Its meadows serve as spawning area, hunting territory or permanent habitat for numerous species. Nevertheless the plant is endangered because of anthropogenic effects and accidentally introduced tropical Chlorophyte *Caulerpa taxifolia*; meadows of *P. oceanica* have suffered a regression in several coastal areas and is recognized by the European Habitats Directive (92/43/CEE) [4]. Various cultivation studies have been done in order to transplant the plant and successful results have been achieved especially with vegetative transplantation of plagiotropic leaf bundles [5].

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The plant consists of compounds such as amino acids [6], carbohydrates [7], fatty acids [8], and sterols [9]. The phenolic compounds were analyzed previously and various constituents were identified [10-14].

Up to now, very limited studies on *Posidonia oceanica* have been carried out in the pharmaceutical sciences. Aqueous and lipid extracts from the rhizomes of the plant were found to be active aganist selected bacteria (Gram+ and Gram-), dermatophytes, and the yeasts [15] besides the antileishmanial activity [16]. Recently antidiabetic, antioxidant and vasoprotective activities were demonstrated [17].

In this study the anatomical features of *Posidonia oceanica* (L.) Delile collected from Turkish coastline were investigated.

Method

The plant was collected by scuba diving from Cesme Aegean Sea in November 1998 at 8 m. depth. The epiphytes were removed by scraping with cotton. The plant was identified at Ege University,

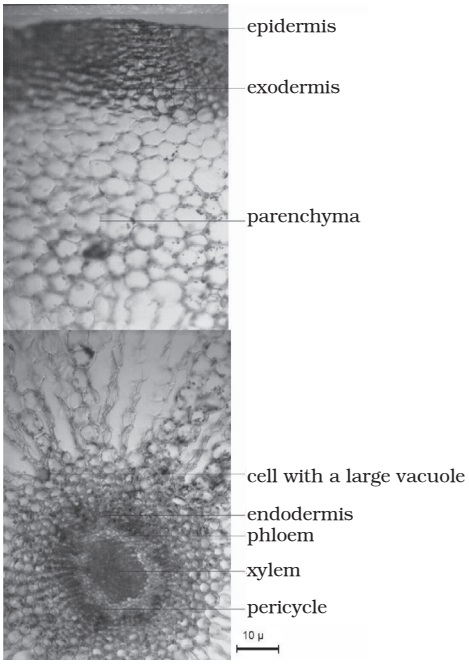

Figure 1
Transverse section of the root

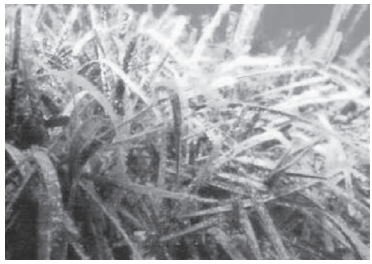

Figure 2
General appereance of *Posidonia oceanica*

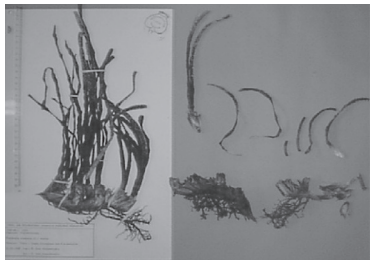

Figure 3
Voucher specimen of *Posidonia oceanica*

Faculty of Pharmacy, Department of Pharmaceutical Botany, Izmir, Turkey and voucher specimens have been deposited at the IZEF Herbarium of Ege University, Faculty of Pharmacy (IZEF5420). Plants for the anatomical study were kept in 70% ethanol. Plant was investigated with transverse sections taken manually (in 10 replicates). Preparations of sartur, chloralhydrate and water were examined with microscope (Carl Zeiss Jena Microscope, Germany) and the original photographs were taken.

Results

General appereance and the voucher specimen of the plant is given in original pictures (Figure 2,3) The anatomical structure of the plant is presented with the following pictures (Figure 1, 4-8).

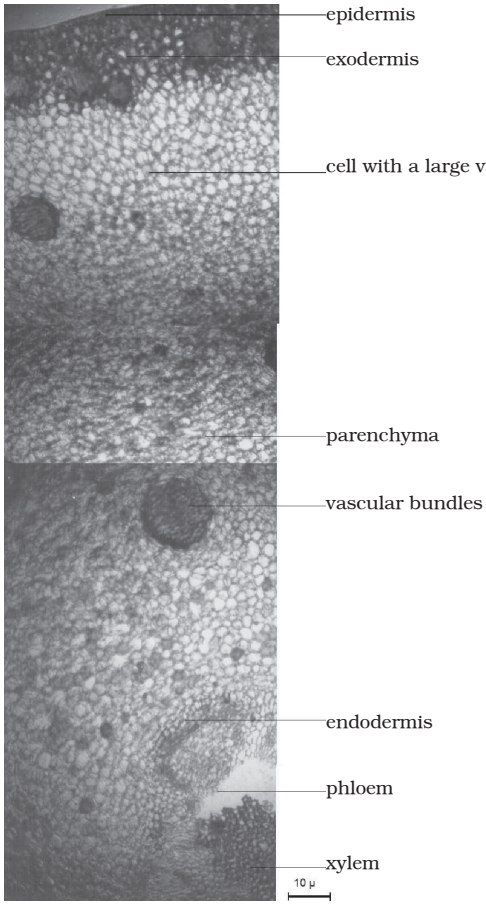

Figure 4
Transverse section of leaf sheath (above)

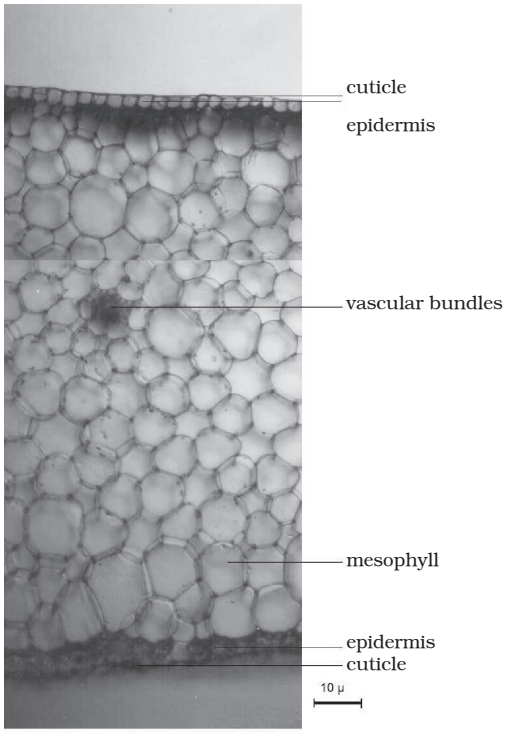

Figure 5
Transverse section of the rhizome (on the left)

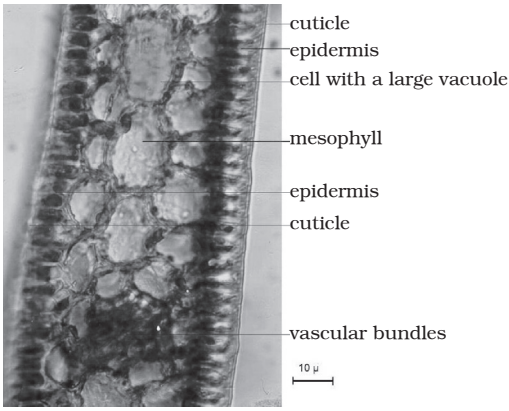

Figure 6
Transverse section of leaf

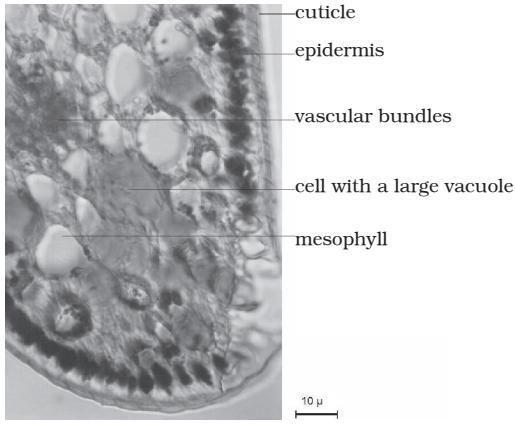

Figure 7
Transverse section of the mature leaf

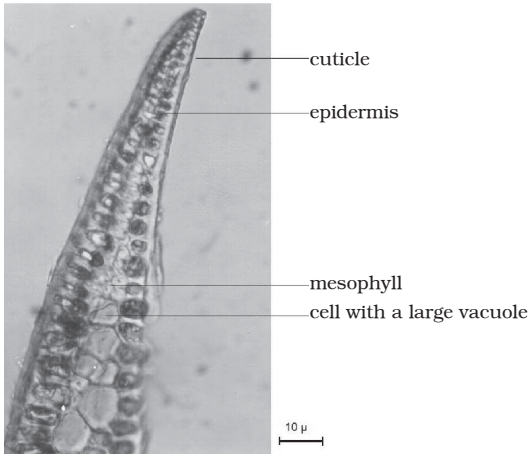

Figure 8
Transverse section of the young leaf

Discussion

In the root; the epidermis was lignified however the exodermis was not. The endodermis was densely presented with a thin membrane around the pericycle. Group of sieve tubes with normal walls surrounded the central xylem which was represented with poorly lignified tracheid elements. In the parenchyma there were cells with a big vacuole.

The anatomy of the rhizome was similar to the anatomy of the root. Epidermis was lignified but exodermis was not. The central stele with

large central protoxylem elements were surrounded by the sieve tubes and suberized endodermis. In the parenchyma numerous vascular bundles were observed besides cells with a big vacuole.

Anatomy of the young leaves and mature leaves were similar. Both were equifacial. Like most other aquatic plants there were no stomata in *Posidonia oceanica* leaves. Leaf surface was covered by a thin cuticle. The porous structure of cuticle is known with serving as an ion - water exchange column regulating nutrient flow between the plant, epiphytes and surrounding water. The epidermis of the leaves was rich in chloroplasts; on the other hand hairs were absent. Epidermis membranes were thickened but not lignified. The mesophyll tissue of the plant was homogeneous, thin walled with chloroplasts. There were cells with a big vacuole. Vascular systems were in similar structure and composition with the vascular land plants.

In contrast to the leaves, the epidermis of the sheath did not have chloroplasts and non - porous cuticle cell wall. The fibre bundles of the sheath were lignified. As a result of this structure sheath fibres persist on the rhizomes long after the other organs rolled away and with wave actions they form marine balls (Posidonia Balls) of different sizes. The leaves of the plant have been investigated with the aspect of phenolic compounds while the root and the rhizomes have not been established. Results of our study showed that numerous large vacuoles were found in the rhizome and the root of the plant. So these organs could also be investigated for their phenolic constituents.

Summary

In this study the anatomical characteristics of *Posidonia oceanica* (L.) Delile (Posidoniaceae) growing in Turkey has been investigated. The marine phanerogam was examined in tranverse sections of its organs of root, rhizome, leaf sheath, young and mature leaves. The results are presented with original photographs. Numerous cells with a big vacuole were detected in root, rhizome and leaves.

Keywords: Posidonia oceanica (L.) Delile, Anatomy, Leaves, Root, Rhizome, Sheath.

Özet

Türkiye'de Yetişen *Posidonia Oceanica* (L.) Delile'nin Anatomik Özellikleri

Bu çalışmada Türkiye'de yetişen *Posidonia oceanica* (L.) Delile (Posidoniaceae)'nin anatomik özellikleri incelenmiştir. Deniz çiçekli bitkisi kök, rizom, yaprak kın, genç ve ergin yaprak organlarının enine kesitlerinde çalışılmıştır. Sonuçlar orijinal fotoğraflar ile sunulmuştur. Kökte, rizomda ve yapraklarda iri vakuollü çok sayıda hücre gözlenmiştir.

Anahtar Kelimeler: Posidonia oceanica (L.) Delile, Anatomi, Yapraklar, Kök, Rizom, Kın.

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