TAMARIX TETRANDRA PALL. EX. BIEB. (TAMARICACEAE) STEM AND LEAF ANATOMY

ANATOMIA TULPINII ŞI FRUNZEI SPECIEI *TAMARIX TETRANDRA* PALL. EX. BIEB. (TAMARICACEAE)

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Abstract: *The article comprises the investigation of the stem and leaf anatomy of a species which frequently grows on the sand banks of Siutghiol lake, Mamaia, near by Constantza town, Tamarix tetrandra Pall. ex Bieb. The stem has a typical secondary structure surrounded by the cortex of parenchymatous tissue. The stem vascular system, composed of secondary xylem and phloem, forms a circular ring around the stem. In between the xylem tissue are the pith rays. The stem epidermis is covered by a thick cuticle. The homogenous bilobed leaf possesses a papillary salt bladders epidermis, withstanding to the salting condition of its habit.*

Rezumat: *Lucrarea înfăţişează unele aspecte anatomice ale tulpinii şi frunzei speciei halofite care creşte frecvent pe malul nisipos al lacului Siutghiol, Mamaia, lângă oraşul Constanţa, Tamarix tetrandra Pall. ex Bieb. Organele vegetative ale plantei prezintă atât caractere anatomice specifice familiei sale şi dicotilelor, în general, dar şi caractere care justifică natura sa halofită. Rădăcina acestei specii prezintă o structură secundară. Tulpina are o structura tipic secundară. Cambiul generează mai puţine elemente de liber şi mai multe de lemn, acestea din urmă brăzdate de raze medulare secundare. Frunza lobată, cu structură mai mult sau mai puţin omogenă, prezintă la exterior o epidermă cu numeroase vezicule saline, care îi dau aspect papilat şi un mezofil omogen cu celule mari parenchimatice, datorită cărora planta rezistă condiţiilor halofite ale mediului în care habitează.*

Key words: *anatomy, leaf, papillary salt bladders, stem, Tamarix tetrandra*
Cuvinte cheie: *anatomie, limb, vezicule saline papiliforme, tulpină, Tamarix tetrandra*

INTRODUCTION

Tamarix tetrandra Pall. ex Bieb. is a deciduous trees and shrubs with green flaky leaves. The plant grows in poor, sandy soils, in full sun. It is the plant that is more hardy to sea salts. This heat and cold tolerant tree or shrub has arching, purple-brown shoots and needle- or scale-like leaves with 4-petaled light pink spring to summer flowers. Another added feature is that this plant is salt tolerant. The foliage is green, red to burgundy colour. The flowers are pink. (CIOCÎRLAN, 2000; SAVULESCU, 1955) In literature histological studies on *Tamarix tetrandra* stem and leaf almost lack. We consider necessary that some anatomical aspects of this species stem and leaf is welcome and justify its halophytic nature.

MATERIAL AND METHODS

The plant was collected form the *Siutghiol lake* sand bank of Mamaia, near by Constantza town. Small pieces of the stem and leaf were fixed in FAA (formalin: glaciar acetic acid:alcohol 5:5:70). The sampled were obtained by the classical methods used in vegetal histology (BERCU & JIANU 2003). Histological observations and micrographs were performed with a BIOROM–T bright field microscope, equipped with a TOPICA 6001A video camera. The microphotographs were obtained from the video camera through a computer.

RESULTS AND DISCUSSIONS

Cross section of the stem reveals that the outermost layer of cells – epidermis – sporadically has been ruptured and replaced by cork, placed just bellow the epidermis, followed by phellogen – a single layer of thin-walled cells flattened in shape and compactly arranged and phelloderm (secondary cortex). The slightly suberized cork cells are compactly packed, without intercellular spaces. The phelloderm consists of parenchyma cells. Some intercellular spaces are found between them (Fig. 1).

Similarly to other dicots stems with secondary structure (FAHN, 1990; BAVARU & BERCU, 2002) the circular ring of cambium produces more secondary xylem towards the inner side and secondary phloem on the outer side (Fig. 2). The secondary phloem comprises few sieve elements, companion cells, phloem parenchyma.

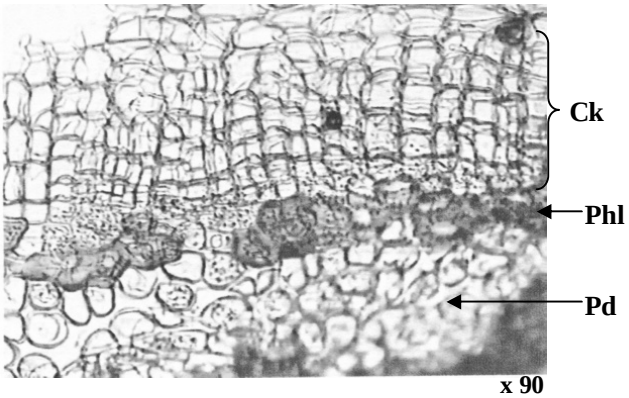

Fig. 1. Portion of the stem cross section with cork, phellogen and phelloderm: Ck- cork, Phl- phellogen, Pd- phelloderm (orig.).

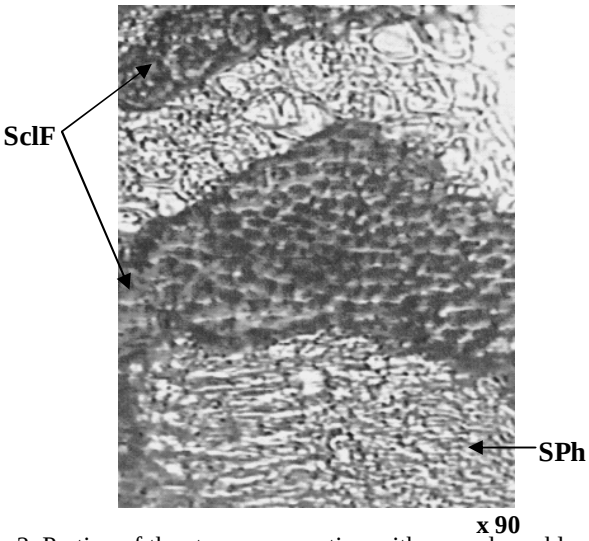

Fig. 2. Portion of the stem cross section with secondary phloem: SclF- sclerenchyma fibres, SPh- secondary phloem (orig.).

Below the cambium zone are the secondary xylem elements, found in the stem of *Tamarix tetrandra*, which consist of secondary xylem vessels and embedded into a sclerenchymatous parenchyma (Fig. 3). In the stem centre are the same secondary xylem elements.

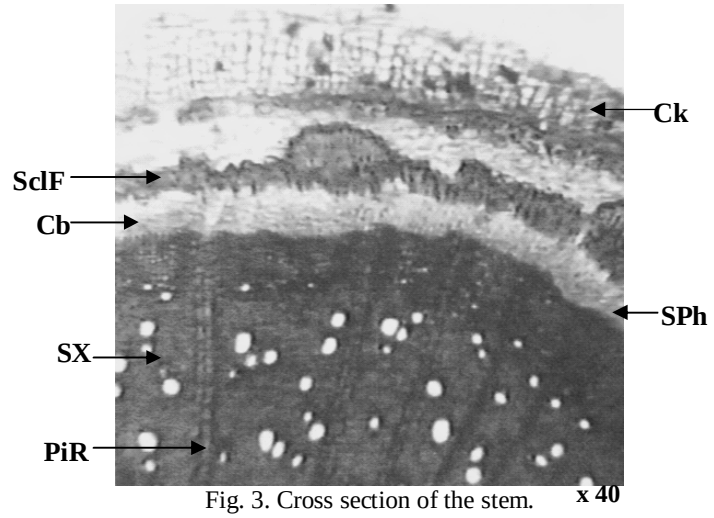

Fig. 3. Cross section of the stem.
Cb- cambium, Ck- cork, PiR- pith ray, SclF- sclerenchymatous fibres, SPh- secondary phloem, SX- secondary xylem (orig.).

Remarkable is the presence of the phloem sclerenchymatous fibres which are more developed in the secondary phloem zone formming the second ring in the stem strengthening (Fig. 3).

Cross section of the leaf reveals a lobed line. Such as other halophytic plants (BATANOUNY, 1992; DELIU, 1993) *Tamarix tetrandra* leaf possesses special secretory elements. Externally is the epidermis possessing numerous papillary salt bladders (glands) on its surface. In between are stomata, shielded by the presence of salt glands (Fig. 4).

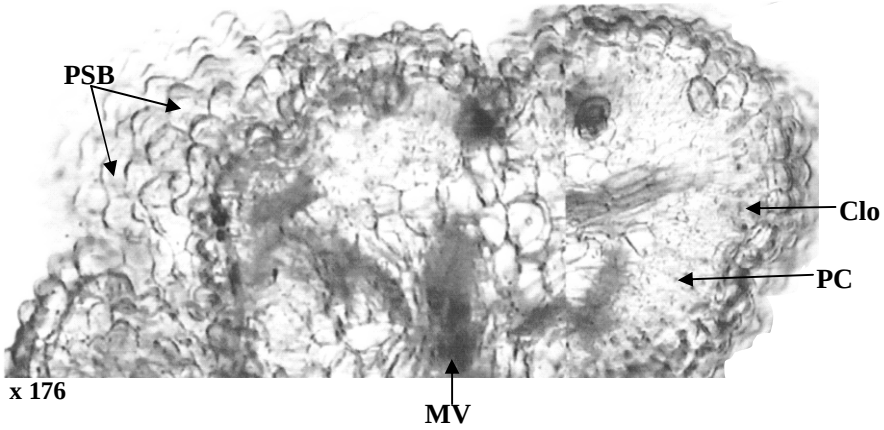

Fig. 4. Cross section of the leaf:
Clo- clorenchyma, MV- mid vein, PC- parenchymatous cells, PSB- papillary salt bladders (orig.).

The mesophyll is more or less homogenous with a slightly chlorenchymatous tissue (2-3 layers of cells) followed by a spongy parenchymatous one. In the leaf centre is the mid vein represented by a collateral vascular bundle from which are detached smaller bundles in a parietal arrangement (Fig. 4).

CONCLUSIONS

Results reveal both dicots and halophytic features of *Tamarix tetrandra* stem and leaf. The stem possesses a typical secondary structure of the stem. The stem vascular system (secondary xylem and phloem) forms compact and conjoint tissues. The mechanical tissue is well developed in the stem structure represented by sclerenchymatous rings and well developed conductive tissue.

The more or less homogenous leaf has a well-developed mesophyll composed of large parenchyma cells. Remarkable are the papillary salt glands The stem and leaf epidermis is covered with a thick layer of cuticle and wax. This is considered of crucial importance for *Tamarix tetrandra* adaptation to the saline conditions found on Siutghiol lake sand bank, it grows on.

LITERATURE

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