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LEAF ANATOMY OF ENDEMIC *ALLIUM MARDINENSE* (AMARYLLIDACEAE) FROM SECT. *ALLIUM*

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ABSTRACT

In this study, the anatomical characteristics of *Allium mardinense* Balos, H.Akan and Yıldırım, an endemic species specific to Mardin province, were revealed. In the anatomical study of *Allium mardinense* species, leaf cross-sections were taken, Fast-green staining method was used and photographs were taken after the samples were turned into fixed preparations. When the anatomical features of the species were examined, it was seen that the general appearance of the leaf and the number of vascular bundles were important. The leaves have an equifacial appearance and the vascular bundles are of the closed collateral type.

Introduction

The Amaryllidaceae family is distributed mostly in seasonally dry areas, Central Asia, the Middle East and North America, which are the centers of diversity of this species (Stearn, 1978; 1992). *Allium* L. is the largest genus of the Amaryllidaceae family, distributed in the northern hemisphere with 1000 natural species worldwide (Friesen et al., 2006; Friesen et al., 2022). Many *Allium* taxa have been discovered in Turkey in recent years. According to the World Checklist of Vascular Plants (POWO 2023), *Allium* is represented in Turkey by 222 taxa, 109 of which are endemic. This number becomes 230 (117 of which are endemic), including 8 taxa (Balos 2022a, 2022b, Balos et al. 2022, Balos *et al*. 2023, Balos and Geçit 2023, Eker 2023, Koçyiğit *et al*.

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2023) that were recently described and are not recorded in the POWO database.

Allium mardinense belongs to the sect. *Allium* based on ovoid bulb, linear leaves, campanulate to ovoid perigon, 3-cuspidate inner filaments, distinct nectariferous pores on ovary, and ovule numbers per loculus (Kollmann 1985).

In addition to morphological data, anatomical findings are also extremely decisive in solving taxonomic problems within the genus. In this study, the leaf anatomy of the *Allium mardinense* plant was elucidated. The results obtained contributed to the taxonomy of the genus.

Material and Methods

In this study, samples belonging to the species presented were collected from the type locality. Leaf samples taken for anatomical studies were used with 70% alcohol (Table 1). In the study, sections were taken with microtomes of 8 and 10 µm thickness using the paraffin embedding method. These sectioned samples were stained with the Fast-green dyeing method and turned into fixed Preparat using Entallan (Johansen, 1940). Photos of the Preparat were taken under the camera with a binocular light microscope.

Table 1. Localities where plant materials were collected

SPECIES NAME	LOCALITY	COLLECTOR NUMBER
ALLIUM MARDINENSE	Turkey. Mardin Province Artuklu Region, Zinnar limestone to Leylak meadows, limestone steppe, 1150 m a.s.l., 2 June 2020	M. Balos 4784 & M. Gecit (HARRAN)

Result and Discussion

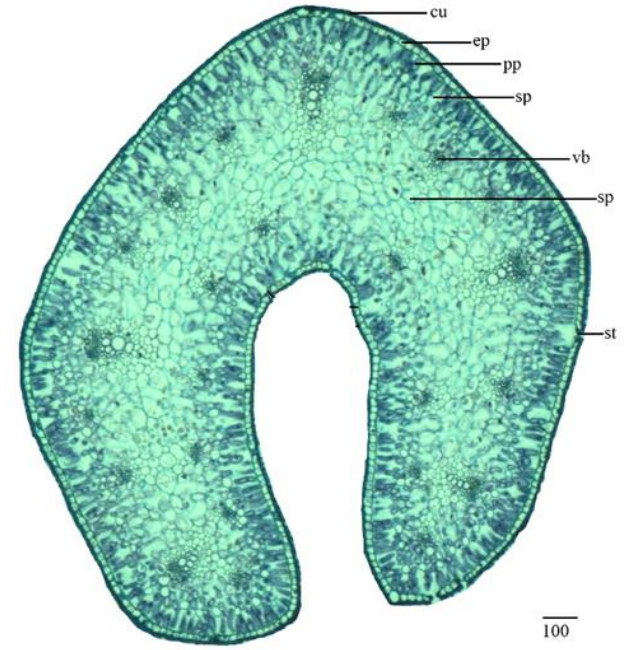
Results

The *Allium mardinense* leaf cross section had a crescent-shaped appearance. In the cross section of the leaf, there were small cells of the epidermis layer in a single row and were covered with a thin cuticle layer. Stomata were few and scattered all around the leaf. Stomas were xeromorphic stomata. Under the epidermis layer there was a mesophyll layer consisting of palisade and sponge parenchyma. At the same time, there was a thin cylindrical palisade parenchyma under the epidermis. Under the palisade parenchyma there was a sponge parenchyma, which was compact and has larger cells in the center. Leaves were observed as ecvifacial. There were 20-24 vascular bundles; the upper part comprised phloem, while the lower comprised xylem (closed collateral type)(Figure 1).

Discussion

Leaf Anatomical features are very important in determining the *Allium* genus. (Namin et al., 2009). In the literature research, *Allium nerimaniae* and *Allium sphaeronixum* species, which are endemic to Turkey, were examined. (Koçyiğit and Kaya 2020; Koçyiğit et al. 2023). While the leaf section of *Allium nerimaniae* is flat, the leaf section of *Allium sphaeronixum* has a cylindrical outline, the leaf section of *Allium* mardinense has a crescent appearance. The stomata of *Allium nerimaniae* are dense and distributed throughout the leaf, whereas in *Allium mardinense* and *Allium sphaeronixum* species, stomata are few and distributed throughout the entire leaf periphery. Vascular bundles are 10-14 in *Allium nerimaniae*, 11-14 in *Allium sphaeronixum* and 20-24 in *Allium mardinense*. In the study, it was seen that the anatomical features were characteristic. It has

been observed that anatomical features are important in species discrimination.



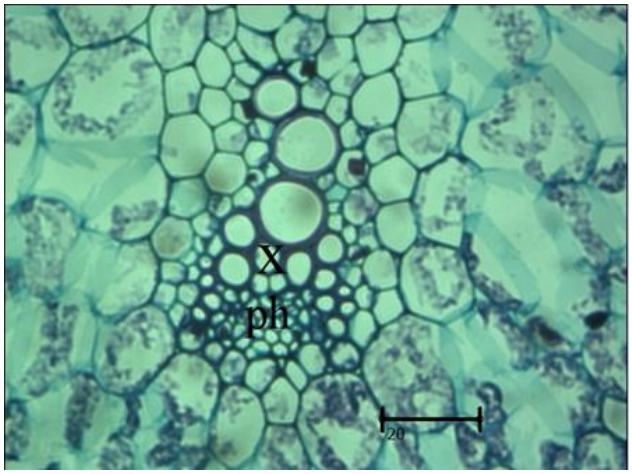


Figure 1: Cross section of *Allium mardinense* leaf (A, B); cu: cuticle, pp: palisade parenchyma, sp: spongy parenchyma, etc: vascular bundle, st: stomata, ap: air parenchyma, ep: epidermis ph: phloem x: xylem,

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