AN ENDEMIC PLANT GROWING IN KAZDAĞI IMPORTANCE AND USAGE AREAS OF Euphorbia anacampseros Boiss. var. anacampseros TAXON

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ABSTRACT

Morphological and anatomical characteristics of Euphorbia anacampseros Boiss. var. anacampseros taxa which is an endemic member of Euphorbiaceae family were investigated. Morphological characteristics and dimensions of these specimens were collected from Kazdağ National Park. Anatomical features (like cross-sections of the root and stem, cross and superficial sections of the leaf) of taxon were investigated.

Keywords: Euphorbia anacampseros, Boiss. var., anacampseros, endemic, morphology, anatomy, laticifer, usage areas, cancer
1. INTRODUCTION

There is biological diversity on earth in the food chain. Many living species are connected each other in terms of the continuity of life and need to exist in the same process. Nowadays, Euphorbiaceae family which is increasingly importance and popularity in researches for cancer treatment, consists of succulent milky plants with mostly herbaceous forms and single or perennial species.

It is known that the Euphorbiaceae family is represented by approximately 8910 species in the world (Bercu and Popoviciu, 2015). The cosmopolitan of this family includes 300 genera and 102 species (Seçmen et al., 2004), but endemic ones are kept its importance, too. It has been recorded in our country are in the LC category (widely distributed and abundant species are placed in this category (Eken et al., 2006), according to the International Union for Conservation of Nature (IUCN) (Özgişi et al., 2017; Çalışkan, 2010; Yeşilyurt and Akaydın, 2017).

1.1. Study Areas

It constitutes the border between the Euxine Region of the European-Sibirian Region and the Eastern Mediterranean Region (Ayaşlıgil, 2006), when Kazdağı is examined phytogeographically. The fact that Kazdağı is where the climatic characteristics and the three floristic regions (Özhatay et al., 2005; Gemicci and Özel, 2001) meet increases the biodiversity in the region and its importance accordingly.

1.2. Usage Areas

It is known that some species of the Euphorbia anacampseros taxon are used for hunting by poisoning fish in rivers and lakes, and also causes poisoning by being given directly against some species such as malaria and jaundice and the risks posed by warts in terms of human health. In addition, it has been reported that the unconscious use of family members in medicine, raw materials in industry, and among the public causes an increae in cancer due to the risk factor of diterpenester (a chemical compounds) (Hecker, 1986). When the recent sources are examined (Luz et al., 2015; Mali and Jadhav, 2015; Erbay et al., 2018; Schippmann, 2018; Aylward et al., 2016; Avcı, 1993) in citotoxicity studies, especially in cancer, would healing, dental and acne treatment, industry and pharmaceutical industry, rubber extraction from latex...
material, dye raw material, cultivation as ornamental plant and wax making, again, it seems that the latex material has a positive effect on the application of the chemical ‘Ingenol angelate’ used to suppress the growth of melanoma cells.

2. MATERIAL AND METHODS

In our study, *E. anacampseros* Boiss. var. *anacampseros* taxon has been chosen as the research subject. As a method, in the areas where the study taxon naturally grows in the Kazdağ National Park (from a weight of 600-700 m on 30.05.2019, its locality was determined on 10.07.2019), considering that the taxon is endemic, a sufficient number of herbarium name, morphological measurements and anatomical cross-sectional studies, and alcohol materials of the specimens were prepared.

Plant specimens don’t have locality and herbarium number. were brought to the laboratory under suitable conditions and morphological measurements such as plant height and width, leaf height and width were taken and comparisons were made with the size details defined in the work named ‘Flora of Turkey and East Aegean Islands’ (Davis, 1982) (Table 1).

**Table 1.** Comparison of the morphological measurements of *Euphorbia* anacampseros Boiss. var. *anacampseros*

|                | Davis (1982) | Genç (1989)        | Tutgun (2020)         |
|----------------|--------------|--------------------|-----------------------|
| Root; decumbent and rarely exceed 20 mm. | Root; branched out. | Root; branched out and 1-5.5 cm. |
| It has been defined as perennial plants that are glabrous, drooping and rising from below at family level. | The umbrella structure at the top of the body is rarely 3-5 beams, rays 2-2.5 cm. | Stem length 16.5-25 cm., width 0.4 cm. |
| Cauline leaves 20 mm., raylet leaves; 17 mm. and its dimensions (5-)10-35(-40) x (3-) 10-35(-40) mm. | Cauline leaves; leathery, fleshy, sessile, frequently alternating (0.9-1.6 cm.), ovate-rhombic, obovate, mukronate at the top, acute-acuminate, very fine toothed edges, side veins indistinct, leaf color mostly reddish pink, branching dichotomous up to 1 or 2 times. | Leaves; length 2.2, 2.4 and between 2.5 cm., width 1.3, 1.4 and between 1.5 cm., shape suborbiculate, margin entire, apex large and mukronate, color generally purplish. |

Specimens were taken into a 70% ethyl alcohol solution prepared on the same day and fixed for 24 hours. The fixed specimens were protected at +4 ºC in the refrigerator. The cross and superficial section were taken for stem, body and leaf tissue examinations.

2.1. Anatomical Features of the Root

In cross-sectional examinations, there is suberinized and ligninized rhizoderm tissue on the outermost part and cannot be observed since the epiderma cells are crushed. Just below is the is the parenchymal cortex tissue consisting of an average of 10 cell lines. In the cortex tissue, there are secretory cells that carry latex. Under the cortex tissue, there is a conduction tissue showing a collateral structure. Phloem tissue occupies less space in general than xylem tissue cells, and cambium is not very prominent. There is a sclerenchymal pith under the conduction issue and in the inner most region (Fig 2).
Fig 2. Root cross-section of *Euphorbia anacampseros* Boiss. var. *anacampseros*:
R: Rhizoderm, Ko: Kortex, Fl: Phloem, Ks: Xylem, La: Laticifer

2.2. Anatomical Features of the Stem

There are papillose structures in the cuticular tissue from the outside to the inside. Collencymatic tissue is located just below the single-row epidermic cells. The cortex tissue is composed of 12-16 rows of parenchymal cells in places and contains a number of latex-bearing cells that can be evaluated densely. In addition, milk pipers are located in the cortex tissue in places. From the end of the cortex cells, phloem tissue and xylem tissue just below respectively, form the collateral bundles. Cambium is not obvious. There are pith rays between the vascular bundle. Under the vascular tissue and in the innermost region there is the parenchymal pith. There are milk tubes containing latex between the pith tissue and the parenchyma cells. In cross-sections taken from well developed roots, it was observed that the pith regions were fragmented (Fig 3, 4).

Fig 3: Stem cross-section of *Euphorbia anacampseros* Boiss. var. *anacampseros*: P: Papillose E: Epidermis Ko: Cortex, La: Laticifer, Fl: Phloem, Ks: Xylem Ö: Pith region
Fig 4: Stem cross-section of *Euphorbia anacampseros* Boiss. var. *anacampseros*: P: Papillose, K: Cuticle, E: Epidermis, Kol: Collenchyma, Ko: Cortex, La: Laticifer, Il: Vascular bundle, Ö: Pith region

2.3. Anatomical Features of the Leaf

The leaf is bifacial. From the outside to the inside, there are papillose structures in both the upper and lower tissue. Epidermis cells are in a single row under a thick cuticle layer. In the upper epidermal structure, there are 2-4 rows of palisade parenchyma cells with dense chloroplasts, sponge parenchyma cells with large intercellular areas just below. Vascular bundles are in collateral type. There are latex-bearing secretory cells throughout the mesophyll tissue. Stomata are of amphistomatic type. Stomata were observed to be anomocytic in the superficial sections taken from the leaves (Fig 5, 6).

Fig 5: Leaf cross-section of *Euphorbia anacampseros* Boiss. var. *anacampseros*: P: Papillose, K: Cuticle, E: Epidermis, Pa: Palisade parenchyma, Sü: Sponge parenchyma
3. DISCUSSION

In our study, the morphological and anatomical features of *Euphorbia anacampseros* Boiss. var. *anacampseros* taxon were examined.

The systematic of *Euphorbia anacampseros* Boiss. var. *anacampseros* taxon:

Regnum: Plantae
Phylum: Magnoliophyta
Classis: Magnoliopsida
Ordo: Malpighiales (Euphorbiales)
Family: Euphorbiaceae
Genus: *Euphorbia*
Species: *anacampseros*
Variety: *anacampseros*

Synonymous: *Euphorbia anacampseros* Boiss. var. *minor*

*Euphorbia anacampseros* Boiss. var. *minor* Boiss. in DC., Prodr., 15 (2): 174 (1862) was determined by Davis (1862).

As a result of limited research, Gökçen et al. (2018), in their morpho-anatomical study on *Euphorbia anacampseros* Boiss. var. *anacampseros* taxon observed anomocytic type stomata between leaf lower and upper surface epidermis cells.

4. CONCLUSION

In our study, some botanical features of *E. anacampseros* Boiss. var. *anacampseros* taxon such as morphological and anatomical structure. Besides this specimens were prepared for identification studies, especially in the herbarium symbol.

Due to the fact that *E. anacampseros* Boiss. var. *anacampseros* taxon, which has a natural distribution in the Kazdağı ecosystem, which is important in the field of biodiversity on a world scale, is included in 122 Important Plant Areas (IPA) of our country, is especially endemic, is in the LC category and is of great economic importance, negative effects of possible climate changes are in particular. It’s must to take the necessary precautions within the scope of protecting all biotic factors from harmful factors by in-situ or ex-situ methods of Kazdağı National Park.
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