

## POLLEN MORPHOLOGY of *Prunus mahaleb* L. (Mahaleb) (Rosaceae) and ITS IMPORTANCE in LANDSCAPING of PARKS and GARDENS

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**ABSTRACT.** Mahaleb (*Prunus mahaleb* L.) is a taxon of Rosaceae, which grows in the winter edges are threaded, the lower faces have feathers along the main vein. Fragrant flowers are white in color. When small or 5 -6 mm fruit is ripe, it gets a black color. It is used as the leading tree in the forestation of arid areas on the forest-step border. In this study, (Mahaleb) taxon, one of the trees in the parks and gardens of Eskişehir, was collected and photographed in 2017-2018. During flowering periods, pollens were determined by Wodehouse, Erdtman and SEM methods and they were studied in Light and Scanning Electron Microscopes. Pollen tricolporate, spheroid, exine tectate-striate. *P. mahaleb* is the reflection of people who are shaded under the park and gardens with its beautiful smell, but with a black and sticky state around it, it creates an undesirable view of the street.

**Keywords:** *Prunus mahaleb*, Pollen Morphology, Light Microscope, SEM, Turkey

### INTRODUCTION

Including natural species that grow under the conditions of the region and adapted to the ecosystem of that region in urban landscaping increases the chances of success in plantation and provides important contributions to the urban ecosystem.

The first condition for organizing an aesthetically, economically and biologically optimal environment is the selection of plant species that are optimally compatible with the physical environment. This condition can only be achieved by analyzing the biological and ecological characteristics of the plant species very well. Knowing the aesthetic appearance that plants will exhibit according to the size and shape they will reach, as well as determining their resistance to habitat demands and environmental conditions are important for a successful landscape application. For this reason, it is imperative to make a versatile ecological analysis of the plant species to be used in the field and to choose plant species accordingly [1].

Urban areas where natural species are used can serve to ensure the continuity of natural ecosystems and to rehabilitate degraded ecosystem parts (Ekici, 2010). The use of natural species adds richness to herbal compositions by eliminating the monotonous appearance of the well-known and frequently used exotic species and cultivated plants. Natural species have economical positive contributions to the city, such as low cost and minimum labor due to not requiring too much maintenance [2; 3].

Mahaleb in the natural vegetation in Eskişehir province is also an exemplary taxon adapted to the urban ecology. This taxon has been selected among the natural species suitable for use in vegetation studies in and around the city, to ensure the arrangement of

the city landscape and the enrichment of the urban ecology. In addition, it is aimed to contribute to plant systematics by revealing the pollen morphology.

## MATERIALS AND METHODS

The material of the study is *Prunus mahaleb*, one of the tree species used for herbal design in the parks in Eskişehir city center. Pollen samples of the plant were obtained from the flowers in the trees located on the side of the street next to Eskişehir TEE Park. Pollen samples of the investigated taxa were taken from dried plants found in the Herbarium (OUFE) of Osmangazi University Faculty of Science and Letters. The examination of current pollens under light microscope was done by Wodehouse (1935) method and examination of fossil pollen by Erdtman (1969) method. Morphological examination of the pollens was done under Nikon binocular microscope, oil immersion objective (x100). 50 times measurements were made for all parameters to determine the average values. Standard deviation and variations have been calculated. Each range in the ocular micrometer is 0.98 µm. Microphotographs were taken with a Nikon 80i type microscope and a KAMERAM Digital camera in the Department of Biology, Faculty of Science and Letters, Eskişehir Osmangazi University. The magnification of the photos is x1000. For Scanning electron microscopy (SEM) examinations, unacetholyzed pollen grains were placed on the fixing plate and covered with gold and examined under Jeol 5600 LV Scanning electron microscope (SEM) [11; 12].

Various basic palynological books and various studies have been used for the diagnosis of pollen [4-12].

## RESULTS AND DISCUSSION

Mahaleb (*Prunus mahaleb*) is a shrub from the Rosaceae family or a tree species that reaches 8–10 m and shed leaves in winter. Leaves are circular to broadly ovate, 3–6 cm in length, margins dentate, hairs along the main vein on the lower surface. Its fragrant flowers are white in color. Small or 5-6 mm sized fruit turns black when ripe. It is used as a pioneer tree in the afforestation of arid places on the forest-steppe border (Figs. 1-4).

It is named with different local names such as İdris tree, Yaban Kirazı, Taş Kirazı, Melem, Endez according to the region where it grows. Mahaleb is from the Rosaceae family and can grow up to 10 meters in height and has white flowers. Ripe fruits are black, bitter and sour in taste. It blooms in March, leaves in April, and begins to bear fruit in June.

Mahaleb tree is a cherry tree in the group of trees that can be planted in the Central Anatolia region. This tree is resistant to many ecological factors, especially drought. It is a tree that grows spontaneously in many regions of our country without the need for irrigation, fertilization and spraying. Mahaleb was used frequently as a landscape element in the Ottoman period, but today this tree is not as important as before. Both its tree and its fruit are useful and valuable trees. Today, it is mostly used to inoculate cherries and sour cherries.

The region between France and Germany in central and southern Europe, northern Pakistan and Kyrgyzstan in western and central Asia, and Morocco in northwest Africa is the homeland of the mahaleb. According to the findings of the Light and Scanning Electron Microscopes studies, the pollens were determined as tricolporate, spheroid, and exine tectate-striate (Fig. 5 and Table 1).



**Fig. 1.** General view of *Prunus mahaleb*



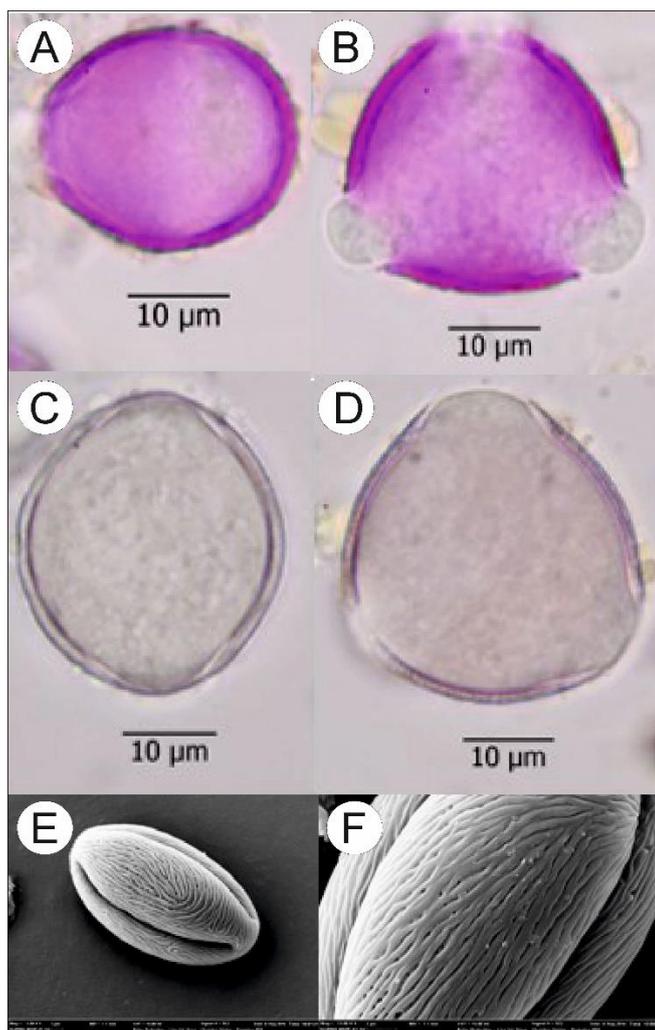
**Fig. 2.** Flowers of *Prunus mahaleb*



**Fig. 3.** *Fruits of Prunus mahaleb*



**Fig. 4.** *Seeds and seed powder of Prunus mahaleb* [Anon.]



**Fig. 5.** Light microscope **A.** Equatorial (W), **B.** Polar (W), **C.** Equatorial (E), **D.** Polar(E) and SEM **E.** Equatorial, **F.** Exine (Ornamentation) photos of the pollen grains of *Prunus mahaleb*

**Table 1.** Palynological measurements of *Prunus mahaleb*

	Wodehouse		Erdtman		
	M	S	M	S	
<b>P</b>	28,2	± 2,38	28,4	± 2,42	µm
<b>E</b>	27,18	± 3,11	31,68	± 4,56	µm
<b>clg</b>	21,47	± 3,27	18,92	± 2,18	µm
<b>clt</b>	9,56	± 1,32	10,34	± 1,24	µm
<b>plg</b>	8,74	± 1,36	9,90	± 1,44	µm
<b>plt</b>	7,14	± 1,41	7,22	± 3,14	µm
<b>L</b>	28,76	± 2,54	31,60	± 2,66	µm
<b>t</b>	6,68	± 1,28	8,74	± 2,16	µm
<b>i</b>	0,74	± 0,24	-	-	µm
<b>Ex</b>	1,08	± 0,20	1,04	± 0,14	µm

### ***Usage Areas***

- Today, medicine, cosmetics, food, drink, paint, furniture industry benefits from mahaleb tree and fruit.
- Mahaleb tree, which emits a pleasant aromatic scent due to the substance called coumarin in its bark, is also used in pipe making. In addition, people who work in furniture and carving prefer this tree because of its durability.
- Oil obtained by distillation from mahaleb seed is preferred in paint industry and ship paints and varnishes due to its water resistance.
- mahlep in wines made from native to Turkey has an important place in the world.
- The mahaleb seeds contain salicylic acid, the main ingredient of aspirin. Therefore, it is preferred in the production of painkillers and antibiotics in the pharmaceutical industry.
- The mahaleb powder obtained by grinding the seeds of the mahaleb is also an indispensable part of the dough and desserts in our kitchens in patisseries and homes.

### ***Benefits of Mahaleb***

- Mahaleb is known to have a lowering effect on blood sugar. For this, it is a spice that helps to lower blood sugar. For this purpose, 2-3 coffee spoons of mahaleb powder can be drunk with water on an empty stomach.
- It has a strengthening effect on the body. Mahaleb, which is powdered as a strengthening and sexual enhancer, can be mixed with honey and eaten 3 dessert spoons a day.
- It is used as a pain reliever.
- It plays a role in reducing prostate enlargement and prostate complaints.
- Mahaleb is also good for the digestive system. It is effective in stomach indigestion and gas problems. It also prevents weight gain because it activates the intestines. Since it accelerates digestion, it helps to reduce the risk of colon cancer in the intestines.
- It protects the body against diseases as it strengthens the immune system. In addition, it has a great effect in reducing abdominal swelling and relieving abdominal pain.
- The calcium contained in mahaleb is good for bone development and bone pain that may occur in the body.
- It is known to be one of the most effective types of spices to eliminate ailments such as asthma and shortness of breath. It removes the phlegm formed in the body and prevents the accumulation of phlegm.
- It balances the sugar level in the blood and prevents the sugar from rising rapidly. It is also good for diabetes due to its balancing feature. If you are at risk of developing diabetes, the insulin hormone it releases eliminates the risk of developing it.

As you can see, mahaleb has many positive effects and benefits for our health. Mahaleb, whose value is decreasing day by day in our country, should be understood again and attention should be paid to mahaleb breeding.

## **CONCLUSION**

The use of natural plant taxa as landscape elements in gardens and parks has many benefits such as easy and good adaptation to environmental conditions, contributing to natural life, requiring less care than foreign origin plants, being more durable and being

a source of nutrition and shelter for wildlife. To ensure ecosystem balance and continuity in cities, it is important to create corridors that will allow transitions between natural vegetation and urban landscape as well as preserving the natural landscape [13-15].

This research aims to raise awareness in terms of the use of plant species suitable for the natural structure of the city in urban green areas by drawing attention to the use of natural plant assets of Eskişehir province in landscape studies. It is thought that the use of natural tree species in landscape designs can increase the success and adaptation of sapling, and will be an appropriate choice against drought and water problems.

In the planting studies carried out in a city, criteria such as the climate of the region, natural vegetation, salinity in the soil, the aesthetic and functional value of the natural species to be used and the ecology of the city should be taken into account in landscape design studies. Besides, higher rates should be given to natural species in terms of maximum shading and water savings. Especially in cities such as Eskişehir where drought and deterioration are seen and felt intensely in the vegetation, these criteria gain great importance. It would be appropriate to show more sensitivity to this issue in the plantation studies to be implemented in the city.

We think that in addition to the systematic characteristics of this taxon in the Rosaceae family, pollen morphologies may also be a distinctive criterion. This study will also shed light on the phylogenetic relationship between the studied taxa. As a result, we believe that pollen studies will be useful for systematic studies since the morphological structures of pollens have distinctive features in determining taxa.

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