

***Anatomy study for leaves Epidermal
for two Genera from Myrtaceae
family(Eucalyptus and Myrtus).in the
middle region of Iraq.***

**دراسة تشريحية لبشرة اوراق جنسين من العائلة الآسية
Myrtaceae (الأس واليوكالبتوس) في المناطق الوسطى من
العراق**

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Abstract

The research included anatomical study for two genera from Myrtaceae family (Eucalyptus and Myrtus coomunis).The research covered the anatomical characteristic of the Epidermis.This research also showed differences in stomatal complex espattern,and the characteristic that related to the shapes of the Epidermal cells have also important taxonomic and diagnostic value in two genera under study.

Introduction

Myrtaceae is an angiosperm family of trees and shrubs that belongs to the order Myrtales containing on most from 5650 species organisation in 130 to 150 genera[1].

The family is divided in to two subfamilies,17 tribes and 142 genera[2].

The family is mainly distributed in the southern hemisphere[3], and is especially diverse in south and central America[4] and Australia[5] and tropical Asia as well as Africa and Europe[6][7].

Eucalyptus is one of the most important genus in the Myrtaceae family, which includes about 500-600 species of trees and shrubs, which present the majority of trees that dominate the forests and most species of genus *Eucalyptus* origin in Australia[8], *Eucalyptus* is one of the largest species in this family[9].

The *Eucalyptus* genus is the source valuable wood and cultivated of the most in the world[10], with 18 million hectares in 90 tropical and sub tropical countries, Africa, south America, Asia and Australia[11].

Myrtus communis are also known as Myrtle true or simple myrtle, which is an evergreen shrub that has been cultivated in the mediterranean region and the middle east where it sowing overland and cultivated including Iraq, Turkey, Iran and Jordan also grows wild in Syria in the mountains of the country's Western-Sham and other countries[12].

Material & Method

Preparation of epidermis sample

Epidermal samples were prepared based on what was stated in the [13]. Models of leaves of each species were selected ,the removal of the upper and lower epidermal was performed using forceps of two sharp ends .The extracted epidermal was then transferred to a petri dish containing safranin by concentration 0.05% and dissolved in ethyl alcohol concentration of 50% and the epidermal was then transferred to a Petri dish containing an ethyl alcohol 70% concentration and several times, and the epidermal is then transferred to glass slide and put a drop of glycerin on it and then covered with the cover slide and then it was ready for examination and the shapes and dimensions of the cells were studied ,as for the stomata, the slides were prepared to study the stomata in the studied species according to the[14]method,In this way, the transparent nail polish was used so that the entire layer of the epidermal was completely painted and then left to dry the coating layer was then carefully cut from the epidermal surface and placed on a clean glass slide .The anatomical study included the following:

Stomatal complexes(Length of the stomata device ,width of the stomata device ,Length of aperture stomata ,width of aperture stomata),Calculation of the stomatal index by equation:

Stomatal index=number of stomata/number of stomata +number of ordinary epidermal cells×100

I took 25 readings for each species and then I took the averages for them.

Results and Discussion

Lamina : Epidermis and stomata

Measurements of epidermal cells and stomata are summarized in **table 1**. There are usually differences in cell form and dimensions between the upper epidermal and lower epidermal surfaces of the leaf as well as between two genera studied.

Where epidermal cells showed a clear difference in their dimensions, where it was observed that the highest extent of the dimensions of epidermal cells in the *Eucalyptus* genus was recorded in the *E.torwood species* (20.5×39.2)um of lower epidermal and (22×38)um of upper epidermal in same species ,While the lowest extent of the dimensions epidermal cells was recorded in the *E.torquata species* (16×22.5)um of the lower epidermal and in both species *E.torquata* and *E.salmanophloia* (17.5×24)um for the upper epidermal as for rest of the species they were intertwined between these two extrnts. When comparing the two genus it was observed that *Myrtus communis* recorded a higher limit than the minimum in the species of genus species for the lower epidermal and less than the upper limit in the species of *Eucalyptus* genus, which reached (12×27.5) um, as for upper epidermal was recorded *Myrtus communis* is a minimum of all species of *Eucalyptus* genus which reached (13.5×21.8)um, as for the mid-rib cells, it was characterized by rectangular shape with straight walls and both genus.

Anticlinal walls of epidermal cells exhibit a little difference between species they are normally straight curved sometimes

Stomata are the narrow elliptical shape of the elongated or Wide elliptical shape on either sides then often more numerous on the abaxial epidermis in the remaining species.

Although ranuncul aceous stomata are present in all species of genus *Eucalyptus* but *Murtus* showed another types in addition to the ranuncul aceous type (**table 2**).Guard cell are kidney shape.[15] supported this truth when they pointed that stomata in Myrtaceae are usually ranuncul aceous except in a few species. Both[16] and [17] found nearly similar types when they observed three types of stomata :anomocytic and anisocytic.

As for the dimensions of the stomata, the highest rate of removal of the stomata in the top surface of the epidemal of the leaf in the *Eucalyptus* genus was recorded in the *E.woodwordii* species (19.3-30.8)um and the lowest rate of recorded in the species *E. torwood*(15.8-21.6) um,as for the lowest rate for the removal of the stomata in the lower surface of the epidermal of the leaf in the species *E.torwood*(15.4-23.6)um and the highest rate for the removal of stomata in the species *E.torquata*(23.2×37.4)um,When comparing the two genus, it was found that the species of *Eucalyptus* genus were higher than the *Myrtus communis* for the holes in the lower surface where it reached the *Myrtus communis*(17.4×18.2)um,as for the stomata in the upper surface, it was in *Myrtus communis*

with a rate similar to the minimum Eucalyptus genus, which reached (13.2x21.6)um. Stomatal complexes can be believed as a significant character in the identification of species.

Table 1. Epidermal cells and stomata dimensions in leaves of two genus (*Eucalyptus* and *Myrtus communis*) in micrometer.

Rate length*Rate width for ordinary cells		Stomatal index on Upper Surface	Stomata in Upper Surface		Stomatal index on Lower Surface	Stomata in Lower Surface		Species
Upper Surface	Lower Surface		Width	Length		Width	Length	
14x30	13x20	18.3 b	-16.4 (18) 17.3 c	-24 (28.5) 26.3 b	21.0 c	(26-19.2) 22.0 b	(28-27.8) 32.4 c	<i>E.camaldulens</i> <i>issubsp.camaldulensis</i>
16x28	10x23	20.2 a	-16 (19.5) 17.3 c	-22 (27.5) 20.6 b	23.2 b	(22.5-25) 29 a	(36.3-29) 32.07 c	<i>E.camaldulens</i> <i>issubsp.obtusa</i>
20x28.6	24.5 18	14.1 c	-17.5 (21) 19.3 b	-28 (33.3) 30.8 a	29.6 a	(25-20.1) 23.2 b	(39-35.8) 37.4 a	<i>E.woodwardii</i>

٢٢x٣٨	x٣٩٤٢ ٢٠٠٥	٢٠٤٧	-١٥) (١٧٤٢	-٢٠) (٢٣٤٥	٢٢	-١٤٤٨) (١٦٤٦	(٢٥-٢٢٤٧)	<i>E.torwood</i>
		a	١٥٤٨	٢١٤٦	bc	١٥٤٤	٢٣٤٦	
		d		c		e	f	
١٧٠٥x٢٤	x٢٢٤٥ ١٦	١٢٤٧	-٢٠) (٢٤٤١	-٢٨٤٦) (٣١	١٥,١	(٢١٤٣-١٩)	-٣٠٤٥) (٣٨٤٥	<i>E.torquata</i>
		d	٢١٤٧	٢٩٤٦	de	٢٠٤٨	٣٣	
		a	a	a		c	b	
x٢٤٤٣ ١٧٤٥	١٥x٢٦	١٣٤٣	-١٦) (٢٠٤١	-٢٥٤٣) (٣٣٤٢	١٤,١	(١٨٤٤-١٥)	(٣٤٤٣-٢٨)	<i>E.salmanophlo ia</i>
		cd	١٨٤٢	٣٠٤٦	ef	١٦٤٦	٣١٤٥	
		bc	bc	a		de	d	
x٣٠٤٠ ١٨٤٥	x٢٧٤٦ ١٧	١٤٤٧	-١٦٤٦) (١٩٤٥	-٢٥٤٣) (٢٨٤٥	١٦,٠٨	(٢٢٤٥-١٩)	-٢٧٤١) (٣١٤٥	<i>E.microthica</i>
		c	١٧٤٧	٢٦٤٤	d	٢٠٤٦	٢٩٤٤	
		c	c	b		c	e	
x٢١٤٨ ١٣٤٥	x٢٧٤٥ ١٢	١٢٤٥	(١٥-١٠)	(٢٥-٢٠)	١٣,٦	(١٩٤٣-١٥)	(٢٠-١٦)	<i>Myrtuscommu nis</i>
		d	١٣٤٢	٢١٤٦	f	١٧٤٤	١٨٤٢	
		e	e	c		d	g	

Note: The numbers out brackets represent average.

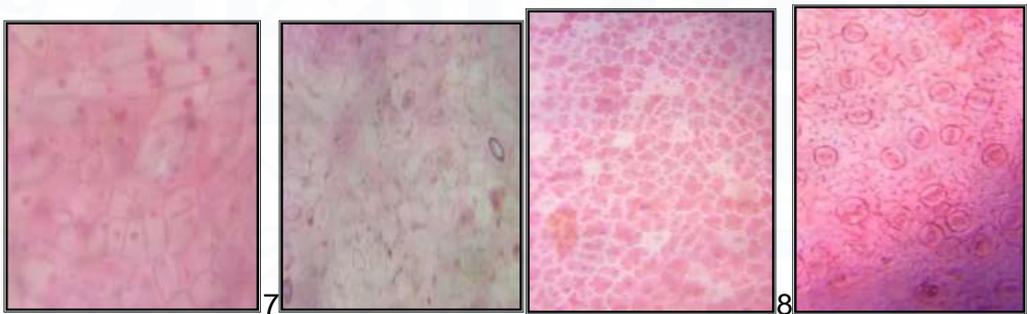
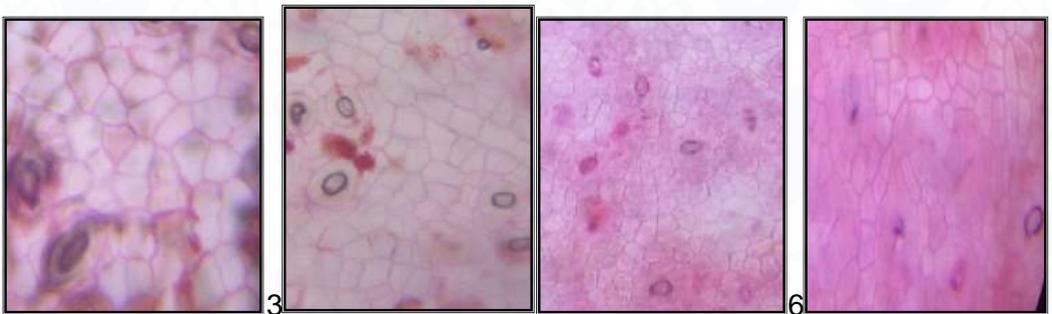
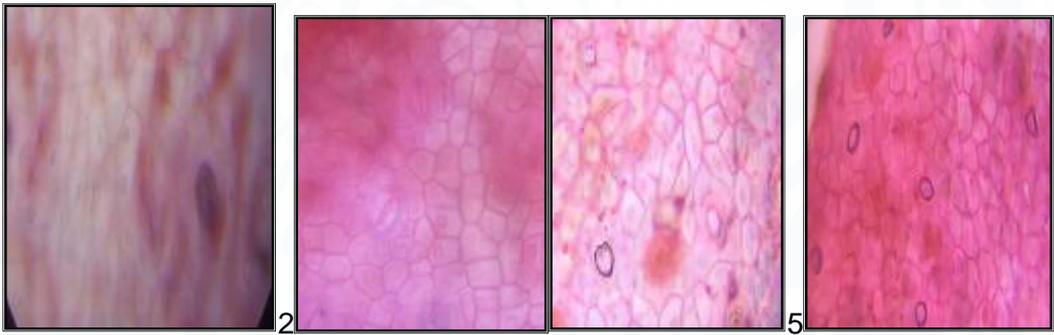
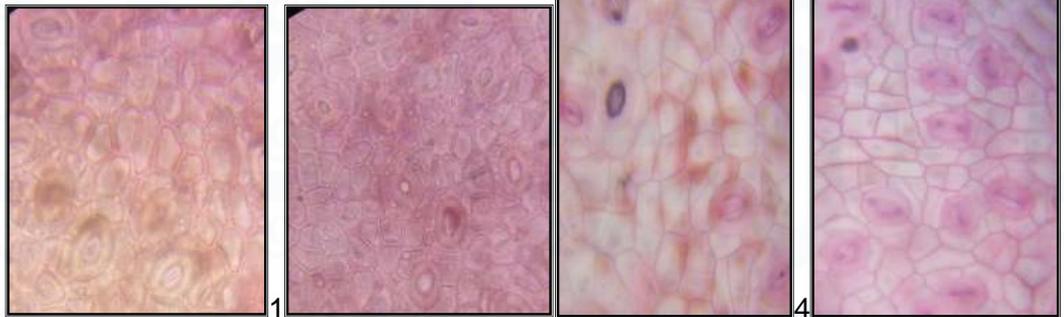
Lower epidermal			Upper epidermal			Species
Number of surrounding epidermal cells	Shape of the guard cells	Stomatal complex type	Number of surrounding epidermal cells	Shape of the guard cells	Stomatal complex type	

5 A	Elongat ed kidney	A	4 A	Elongat ed kidney	A	<i>E.camaldulensis</i> <i>subsp. camaldulensis</i>
5 A	Elongat ed kidney	A	4 A	Elongat ed kidney	A	<i>E.camaldulensis</i> <i>subsp.</i> <i>obtusa</i>
3 A	Kidney	A	4 A	Kidney	A	<i>E.woodwordii</i>
4 A	Elongat ed kidney	A	5 A	Short kidney	A	<i>E.torwood</i>
4 A	Elongat ed kidney	A	4 A	Kidney	A	<i>E.torquata</i>
5 A	Short kidney	A	4 A	Kidney	A	<i>E.salmanophlia</i>
3 A	Kidney	A	4 A	Short kidney	A	<i>E.microthica</i>
3 A	Kidney	A+An	3 a	Kidney	A+An	<i>Myrtuscommunis</i>

Table 2. qualitatively of the guard cells in the leaves of two genus (*Eucalyptus* and *Myrtuscommunis*) in micrometer.

A=Anomocytic type

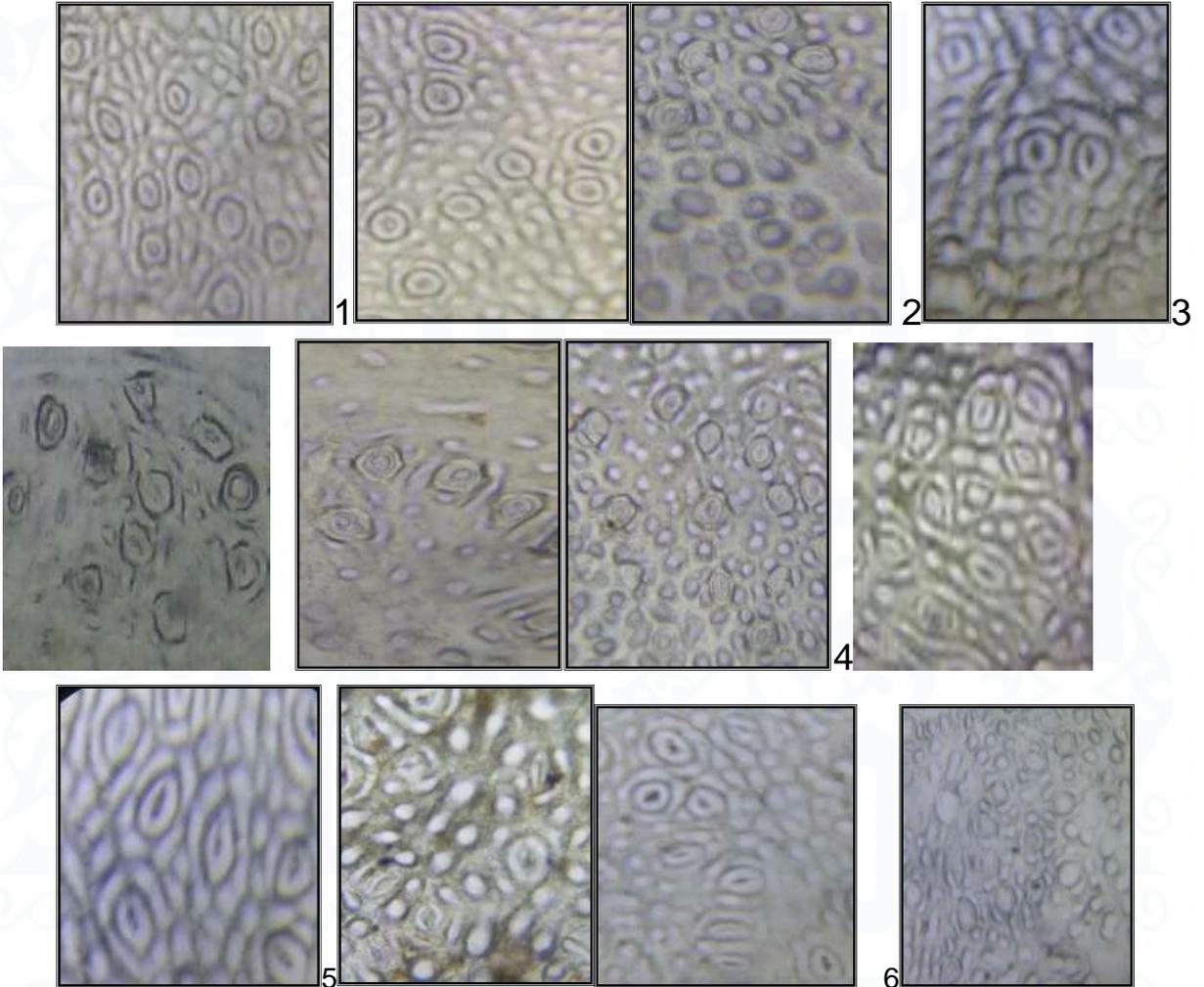
typeAn=Anisocytic

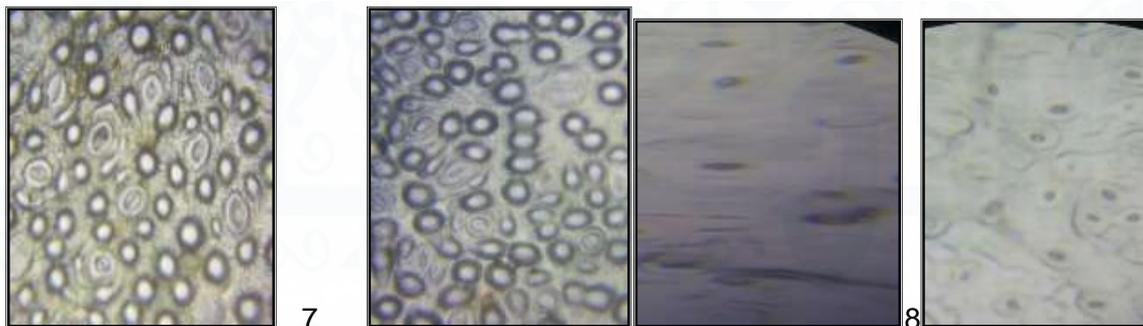


ABAB

Figures 1. Surface view of epidermal cells in leaves of two genus (*Eucalyptus* and *Myrtuscommunis*). A. Upper epidermis, B. Lower epidermis

1-*E.camaldulensis* subsp.*camaldulensis*, 2- *E.camaldulensis* subsp.*obtusa*, 3-*E.woodwardii* 4- *E.tarwood* ,5-*E.terquata*, 6- *E.salmanophlia* , 7-*E.microthica* ,8- *Myrtuscommunis*





ABAB Figures 2. Surface view of stomata in leaves of two genus (*Eucalyptus* and *Myrtus communis*).

A. Upper epidermis, B. Lower epidermis

1- *E. camaldulensis* subsp. *camaldulensis*,

2- *E. camaldulensis* subsp. *obtusa*,

3- *E. woodwardii*

4- *E. tarwood* ,5- *E. terquata* ,6- *E. salmanophlia* ,7- *E. microthica* ,8- *Myrtus communis*

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