

Macro- and Micromorphological Study of *Albizia lebeck* (L.) Benth Cultivated in Egypt

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ABSTRACT

The macro- and micromorphological study of leaves, stems and inflorescence of *Albizia lebeck* (L.) Benth was carried out with the aim of finding the characteristic features of the different organs of the plant in both entire and powdered forms.

Key Words: *Albizia lebeck* (L.) Benth, macro- and micromorphological study, leaves, stems and inflorescence.

INTRODUCTION

Albizia lebeck(L.) Benth (woman's tongue, Indian siris tree) is a fast - growing, medium sized, deciduous tree cultivated in Egypt on canals and near humid sites, especially in the countryside as an ornamental shade plant. It belongs to subfamily Mimosoideae, family Leguminosae(Turner *etal.*,1971; Sharma 1993 and Boulos 1999) . Biological evaluation of the ethanolic extract of the aerial parts of the plant proved antibacterial, antifungal, significant analgesic, antiinflammatory and anticancer activities especially breast carcinoma (Kokila *etal.*, 2013; De Paula *etal.*, 2001; Farag *etal.*,2013 and Wang *etal.*,2013)

Phytochemical investigation of petroleum ether, chloroform and ethyl acetate fractions of the alcoholic extract of stem bark of *Albizia lebeck* (L.) Benth led to isolation of nine known compounds including lupenone , freidelin , lupeol , sapiol , mixture of β -sitosterol & stigmasterol , β sitosterol- 3-O-glucoside & stigmasterol -3-O-glucoside , stigmasterol - 3-O-glucoside, luteolin and rutin (Abd El-Ghany *etal.*,2015) Also two new oleanane triterpene type saponins named lebeckanin I and lebeckanin II, in addition to one new cyclic alcohol isomer of methyl inositol (D-1-O-methyl-cis-inositol) were isolated from butanol fraction of the alcoholic extract of

Albezia lebeck flower (Abd El-Ghany *etal.*,2015) Moreover, the different *A. Lebeck* (L.) Benth extracts showed variable promising strengths in anti-inflammatory, analgesic, antioxidant, anticancer and antimicrobial activities (Abd El-Ghany *etal.*,2015)

The literature review showed no report concerning the macro- and micromorphology of the plant. The present study includes macro- and micromorphological study of the leaves, stem, and inflorescence with the aim of finding out the diagnostic features by which the plant can be easily identified in both entire and powdered forms.

EXPERIMENTAL

PLANT MATERIAL

The plant material used in this work, *Albizia lebeck* (L.) Benth family Leguminosae, was collected in the flowering stage in May 2010 from the vicinity of Benha governorate, Qalioubia, Egypt. The identification was kindly verified by Prof. Dr. Husain Abdel Baset Professor of Taxonomy, Department of Botany, Faculty of Science, Zagazig University, Egypt. The material used for this study was either fresh or preserved in glycerin-alcohol mixture-water (1:1:1).

I. Macromorphology:

Albizia lebeck (L.) Benth (Fig.1A) is a fast growing, deciduous tree measuring 10 to 12 m in height and 0.5-1m width. It

shows large crowns of wide spreading branches. Leaves are compound bipinnate. Flowers are bisexual, yellowish-white in colour, heavily scented, usually appear with the new leaves over an extended period from April to September.

Leaves (pinnae) (Fig.1A &1B) are compounds bipinnate with 2 to 4 pairs of pinnae along rachis 5 to 10 cm long. Pinnae comprise rachilla 5 to 10 cm long bearing 3 to 11 pairs of leaflets (pinnule). leaflets are oblong to elliptic-oblong , showing round apex, entire margin and assymetric base with pulvinus at its connection with the stem. The midrib is prominent on both sides but more prominent on the lower surface and divides the lamina into 1/3 & 2/3. The leaflets have hairy surfaces; the upper surface is dark green while the lower one is pale green in colour. Each leaflet measures 3 to 5 cm in length and 1.5 to 2 cm in diameter. The leaflets have reticulate pinnate venation, papery texture characteristic odour and slightly astringent taste. . The rachis (Fig.1B) is solid, cylindrical and yellowish green in colour. It measures 5 to 10 cm in length and 1.5 to 3 mm in diameter.

The main trunk of the plant is rigid, cylindrical and monopodially branched. The outer surface of the bark is grayish brown in colour, rough, sometimes flaky, showing numerous lenticels and the inner surface is reddish brown. The terminal and lateral branches are thinner, erect and having short internodes. They are green in colour when young, rapidly becoming greyish-brown with time and measure 0.4 to 1m in length and 10 to 30 cm in diameter.

Inflorescence (Fig. 1A) is racemose, terminal or axillary (often 2 or more per axil), 5 to 9 cm diameter, semi-globular, cluster of 15 to 40 flowers. Flower (Fig. 1C) is fragrant, yellowish-white in colour, bisexual, with pedicels measuring 1.5 to 4.5 mm long. Calyx (Fig. 1D) consists of 5 united, small, yellowish-green sepals,

being funnel- shaped and ending with 5 short obtuse apical teeth. The sepals show hairs on the outer surface. It measure 3.5 to 5 mm long, 0.8 to 1.2 mm width. Corolla (Fig. 1E) consists of 5 united, small, yellowish green petals , forming funnel shaped structure, ending with 5 acute to obtuse apical teeth. The petals are united for about $\frac{3}{4}$ of its length and show hairs particularly on the outer surface. The petal attains 5 to 11 mm long, 1 to 1.5 mm width. Androecium (Fig. 1F) is formed of indefinite number of stamens, united at the base forming a filament tube. The filaments are long, slender showy in the free part , white to creamy in colour, tipped with pale green anthers, and becoming dark yellowish brown with age. It measures 1.5 to 3 cm long. Gynaecium (Fig.1G) consists of superior ovary carrying a cylindrical, filiform style terminating with a very minute papillosed stigma. The gynaecium is monocarpellary, unilocular showing marginal placentation

II- Micromorphology:

The cell dimensions of different tissues of leaves, stems and inflorescence are listed in table 1.

The Leaf: This study includes:

- a- The leaflet (pinnule).
- b- The rachis of pinnule.
- c- The rachis of pinna

.a-The leaflet:

A transverse section of the leaflet (Fig. 2A, 2B &2C) shows isobilateral structure with two rows of palisade abutting both surfaces. The palisade of the lower surface being discontinuous in the midrib region. The midrib is prominent on both sides but more prominent on the lower surface. It shows a parenchymatous cortex with collenchymatous band below each epidermis and transversed by collateral vascular bundle. The vascular bundle is surrounded by complete ring of lignified pericyclic fibers and a sheath of parenchymatous cells

containing prisms of caox crystals forming a crystal sheath.

The upper epidermis of lamina (Fig. 2C&3A) is formed of polygonal cells with moderately thick wavy anticlinal walls. The upper epidermal cells of the midrib (Fig. 2B& 3C) are axially elongated with moderately thick wavy anticlinal walls, thick outer walls. The lower epidermis of lamina (Fig.2C&.3B) is formed of polygonal papillosed cells with moderately thick wavy anticlinal walls and thick outer periclinal wall. The lower epidermal cells of the midrib region (Fig. 2B &3D) are axially elongated with moderately thick straight anticlinal walls. The upper and lower epidermises are covered with thick smooth cuticle. The stomata (Fig.3B) are oval, of paracytic type and present only in the lower epidermis of lamina. Covering trichomes (Fig. 3H) are present on both surfaces. They are unicellular, thick-walled, with blunt apicis and covered with warty cuticle.

The mesophyll (Fig.2C) is isobilateral consists of upper and lower palisades and a spongy tissue. The upper and lower palisades (Fig.2C) each consists of two rows of cylindrical columnar and radially elongated cells. The lower palisade being shorter with slightly wavy anticlinal walls. The spongy tissue (Fig. 2C) consists of 2 rows of more or less rounded parenchymatous cells with thin cellulosic walls and wide intercellular spaces. Vascular strands are found scattered between palisade and spongy tissue.

The cortical tissue of the midrib (Fig.2A& 2B) is parenchymatous showing collenchymatous band below each epidermis. The collenchymatous layer is formed of one row below the upper epidermis and 3 to 4 rows below lower epidermis. The cells are more or less rounded with thick cellulosic walls. The parenchymatous region is formed of 3 to 4 rows of more or less rounded cells with thin

cellulosic walls and small intercellular spaces. Few crystals of ca-oxalate are present in the cortical region.

The pericycle (Fig. 2A& 2B) is formed of complete ring of 3 to 6 rows of lignified fibers. The pericyclic fibers (Fig.2B& 3I) are spindle-shaped, thick lignified walls, wide or moderately wide lumen and acute or blunt apices. Parenchymatous cells containing prismatic crystals of calcium oxalate abutting on these groups of fibers forming crystal sheath.

The vascular tissue (Fig.2B) is composed of an upper xylem and lower phloem. The xylem (Fig.2B&3E) is formed of moderately thick-walled lignified spiral vessels and lignified wood parenchyma. The phloem (Fig.2B) is composed of polygonal thin-walled cellulosic elements.

The microscopical numerical values of the leaf are summarized in table 2

b- Rachis of pinnule:

A transverse section in the rachis (Fig. 4A & 4C) is more or less planoconvex in outline with a somewhat prominent ridge in the middle of upper side. It consists of an epidermis surrounding a parenchymatous cortex. The vascular system is formed of an interrupted ring of outer phloem and inner xylem surrounded by continuous ring of lignified pericyclic fibers. The pith is wide and parenchymatous. There is a small vascular strand located in the upper side formed of an outer phloem and inner xylem and surrounded by complete ring of pericyclic fibers.

The epidermal cells (Fig. 5A& 4C) are polygonal, somewhat isodiametric, with straight thick anticlinal walls and covered with thick smooth cuticle. The stomata are absent on the epidermis of the rachis. Unicellular non-glandular trichomes (Fig.5B) are occasionally observed on the epidermis of the rachis of pinnule. They

have thick wall and covered with warty cuticle.

The cortical tissue (Fig. 4A & 4C) is formed of 6 to 8 rows of more or less rounded thin-walled parenchymatous cells containing numerous prisms of calcium oxalate measuring 7-10 μ in diameter and 9-12 μ in length. and starch granules measuring 1-3 μ in diameter. The cortical tissue shows collapsed parenchymatous cells in the lower side.

The pericycle (Fig. 4A & 4C) is formed of complete ring of lignified fibers. The pericyclic fibers (Fig. 4C&5B) are spindle-shaped, with thick or thin wall, wide or narrow lumen, blunt or acute apices. Parenchymatous cells containing prismatic crystals of calcium oxalate abutting on these groups of fibers forming crystal sheath.

The vascular tissue (Fig.4A & 4C) is formed of interrupted ring of an outer phloem and inner xylem surrounding a parenchymatous pith. The xylem (Fig. 4C&5B) is formed of spiral or pitted lignified vessels and pitted wood parenchyma.

The pith (Fig. 4A& 4C)) is wide, formed of thin-walled pitted cellulosic parenchyma with narrow intercellular spaces. It contains numerous simple or compound starch granules.

c- Rachis of pinnae:

A transverse section in the rachis of pinnae (Fig. 4B & 4D) is nearly similar in outline and structure to the rachis of pinnule, but showing two vascular strands surrounded by a complete ring of pericyclic fibers in the upper side.

Powdered leaf:

The powdered leaves (Fig.3&5C) are dark green in colour with faint characteristic odour and slightly astringent taste. It is characterized microscopically by the following:

1-Fragments of epidermis showing polygonal, sometimes axially elongated cells having straight anticlinal walls, covered with smooth cuticle, paracytic stomata and non-glandular trichomes or sometimes their cicatrices.

2-Abundant non-glandular trichomes being unicellular, straight or curved and covered with thick warty cuticle.

3-Fragments of crystal sheath.

4-Numerous prismatic crystals of calcium oxalate.

5-Abundant scattered simple rounded starch granules with neither visible hilum nor striations.

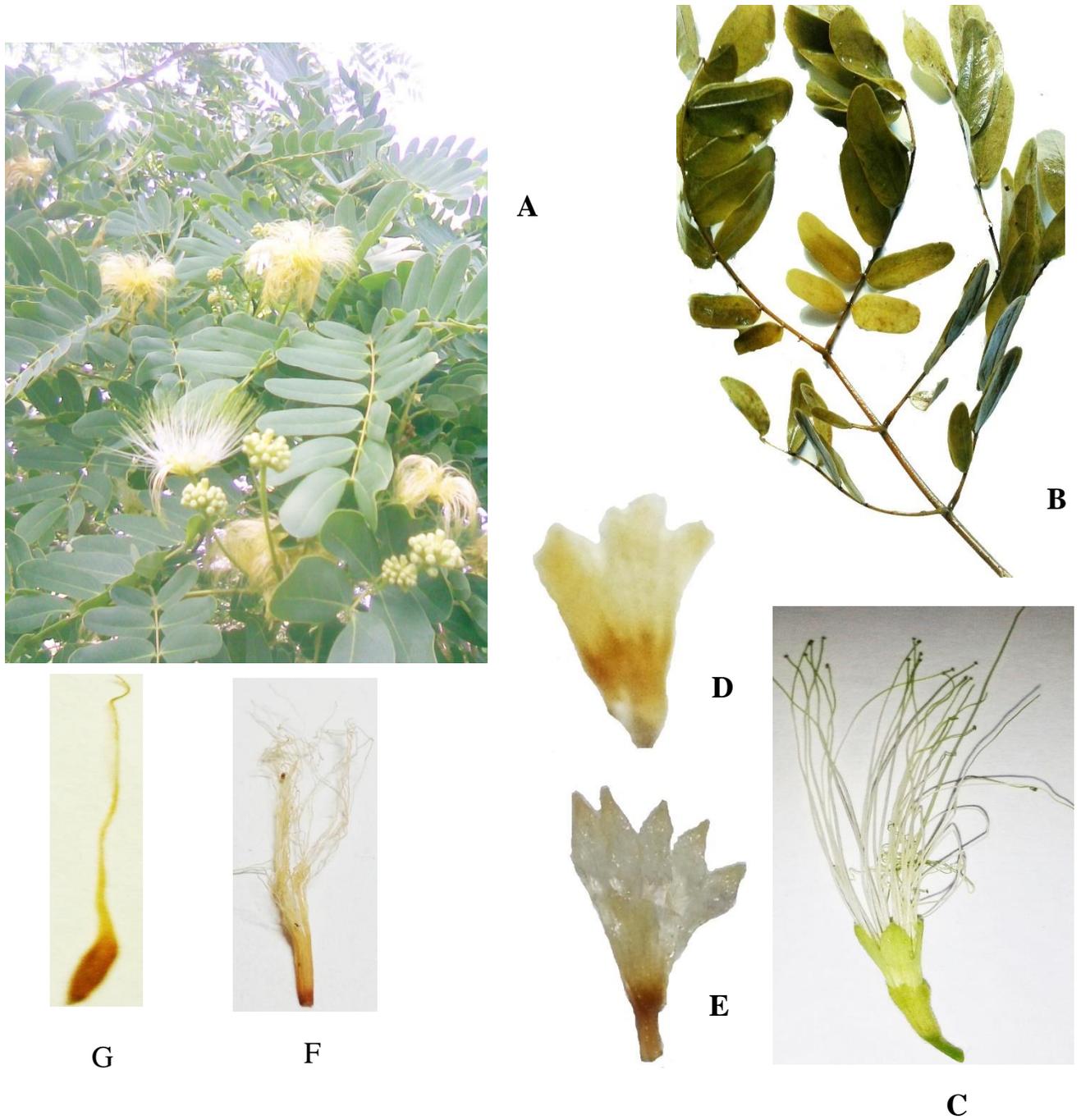


Fig.(1) Macromorphology of *Albizia lebeck* (L.)Benth

- | | | | |
|------------------------------|----------|-----------------------------|---------|
| A- Photograph of aerial part | (x 0.03) | E- Photograph of corolla | (x 4) |
| B- Photograph of leaves. | (x0.4) | F- Photograph of androecium | (x 2) |
| C- Photograph of flower | (x 2.1) | G- Photograph of gynaecium | (x 1.4) |
| D- Photograph of calyx | (x 6.6) | | |

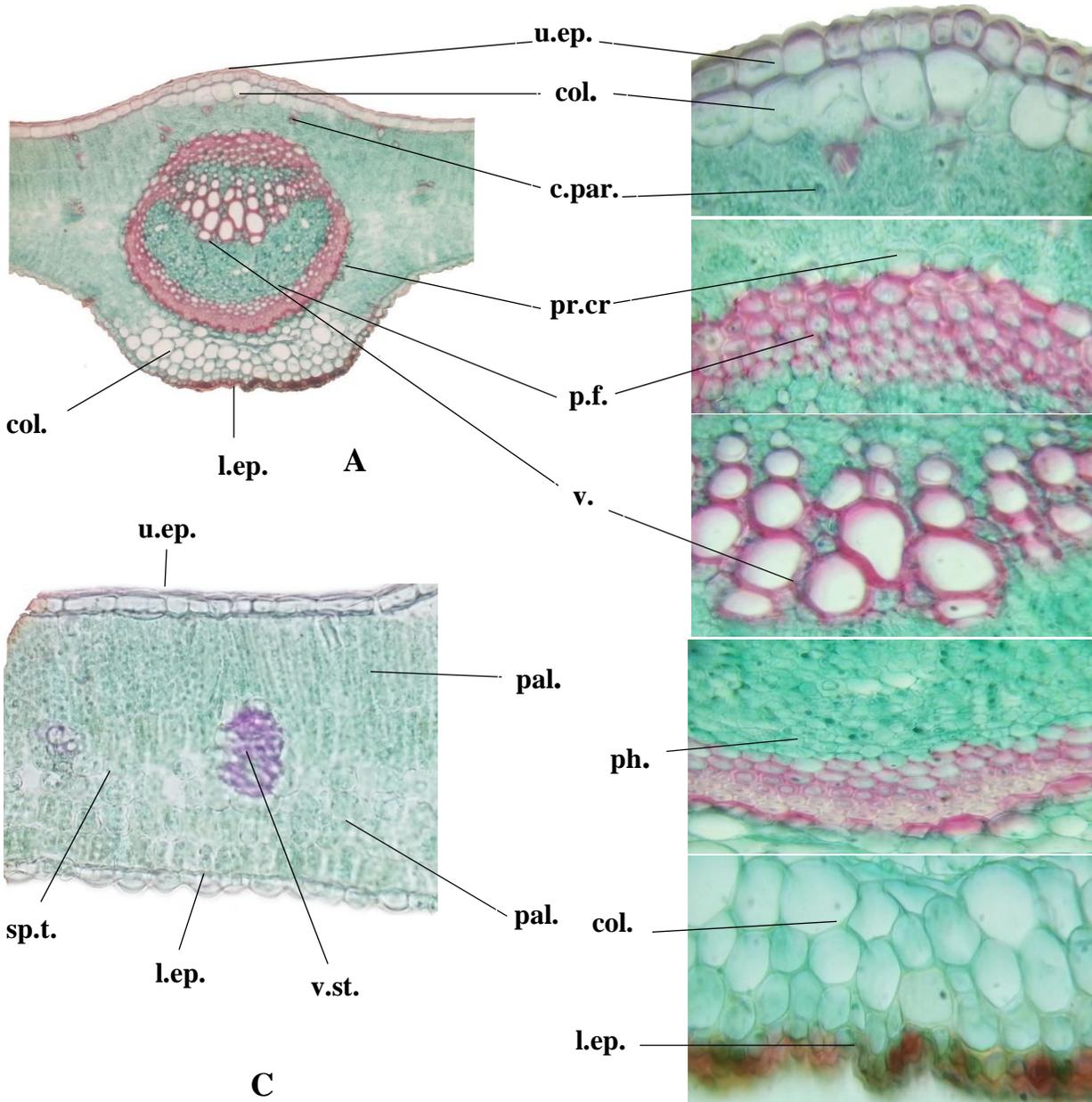


Fig. (2) :Photos of The pinnule of *Albizia lebeck* (L.) Benth

A. Diagrammatic transverse section of the (x 121)

B. Detailed transverse section of the midrib. (x 394)

C. Detailed transverse section of the lamina. (x 480)

c.par., cortical parenchyma; col., collenchyma; l.ep., lower epidermis; pal., palisade; p.f., pericyclic fibers; ph., phloem; pr.cr., prismatic crystal of calcium oxalate; sp.t., spongy tissue; u.ep., upper epidermis; v.st., vascular strand; v., vessels.

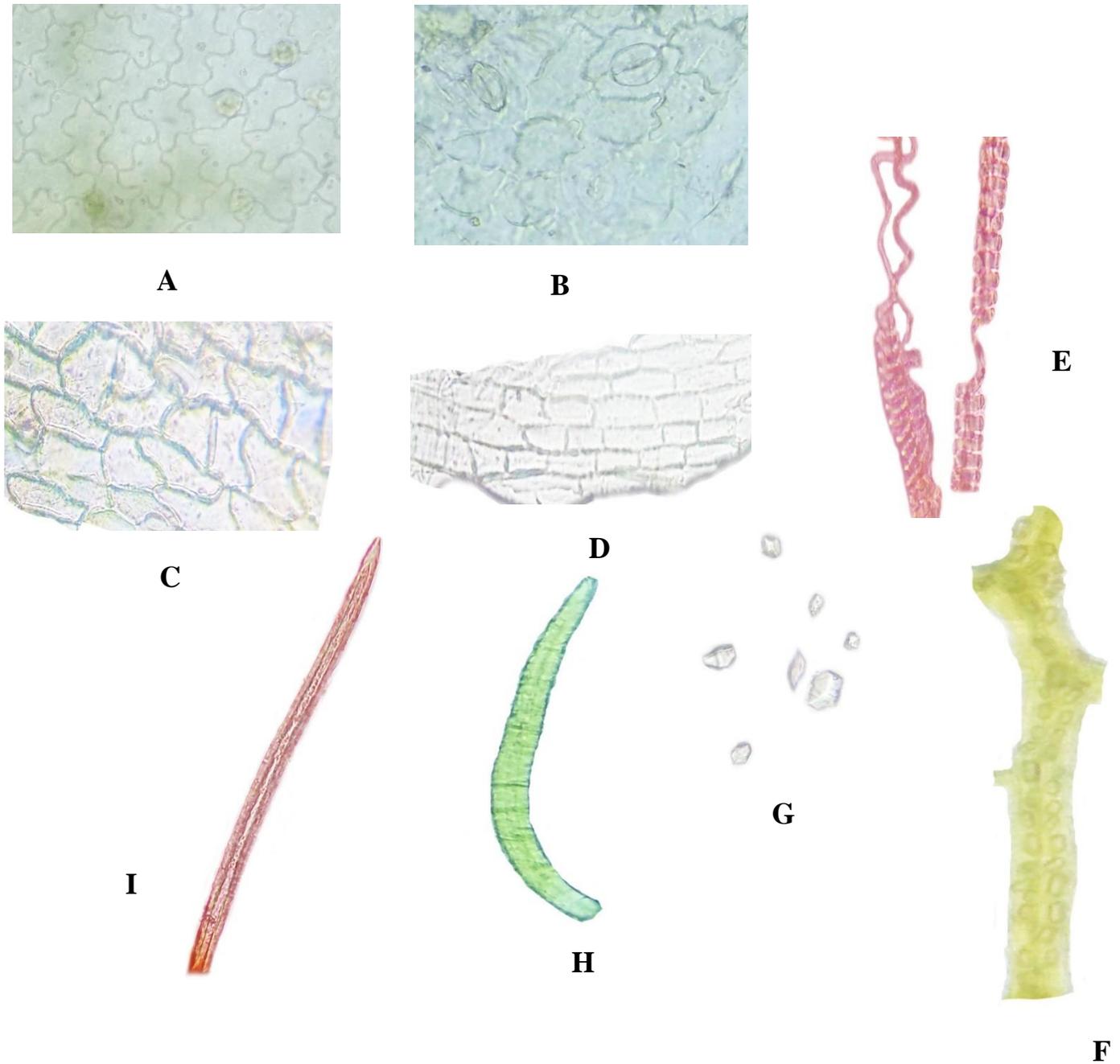


Fig. (3): Photos of the epidermal cells and some elements of the Pinnule of *Albizia lebeck* (L.) Benth

- | | | | |
|----------------------------------|---------|----------------------------------|---------|
| A. Upper epidermal cells of the | (x 583) | B. Lower epidermal cells of the | (x 773) |
| C. Upper neural epidermal cells. | (x 600) | D. Lower neural epidermal cells. | (x 647) |
| E. Vessels. | (x 167) | F. Crystal sheath. | (x 160) |
| G. Prismatic crystals of calcium | (x 240) | H. Covering trichomes. | (x 285) |
| I. Pericyclic fiber. | (x 333) | | |

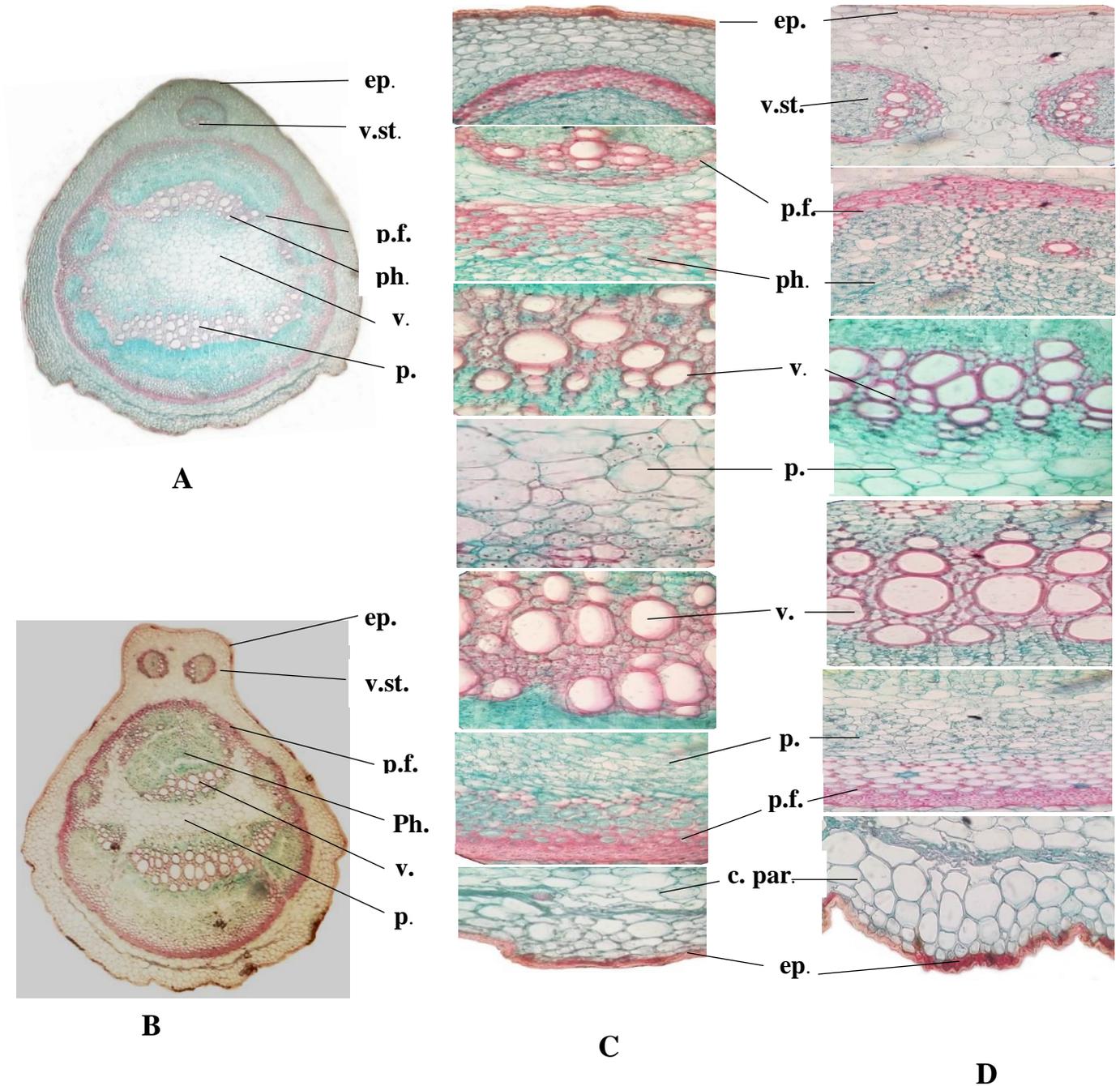


Fig. (4) :Photos of The Rachis of the leaf of *Albizia lebbbeck* (L.)Benth

- A. Diagrammatic transverse section of rachis of pinnule. (x 60)
- B. Diagrammatic transverse section of rachis of pinna. (x 60)
- C. Detailed transverse section of the rachis of pinnule. (x 240)
- D. Detailed transverse section of the rachis of pinna (x 240)

c.par., cortical parenchyma; ep., epidermis; p, pith; p.f., pericyclic fibers; ph., phloem; pr.cr., prismatic crystal of calcium oxalate; v.st., vascular strand; v., vessels; w.par., wood parenchyma.

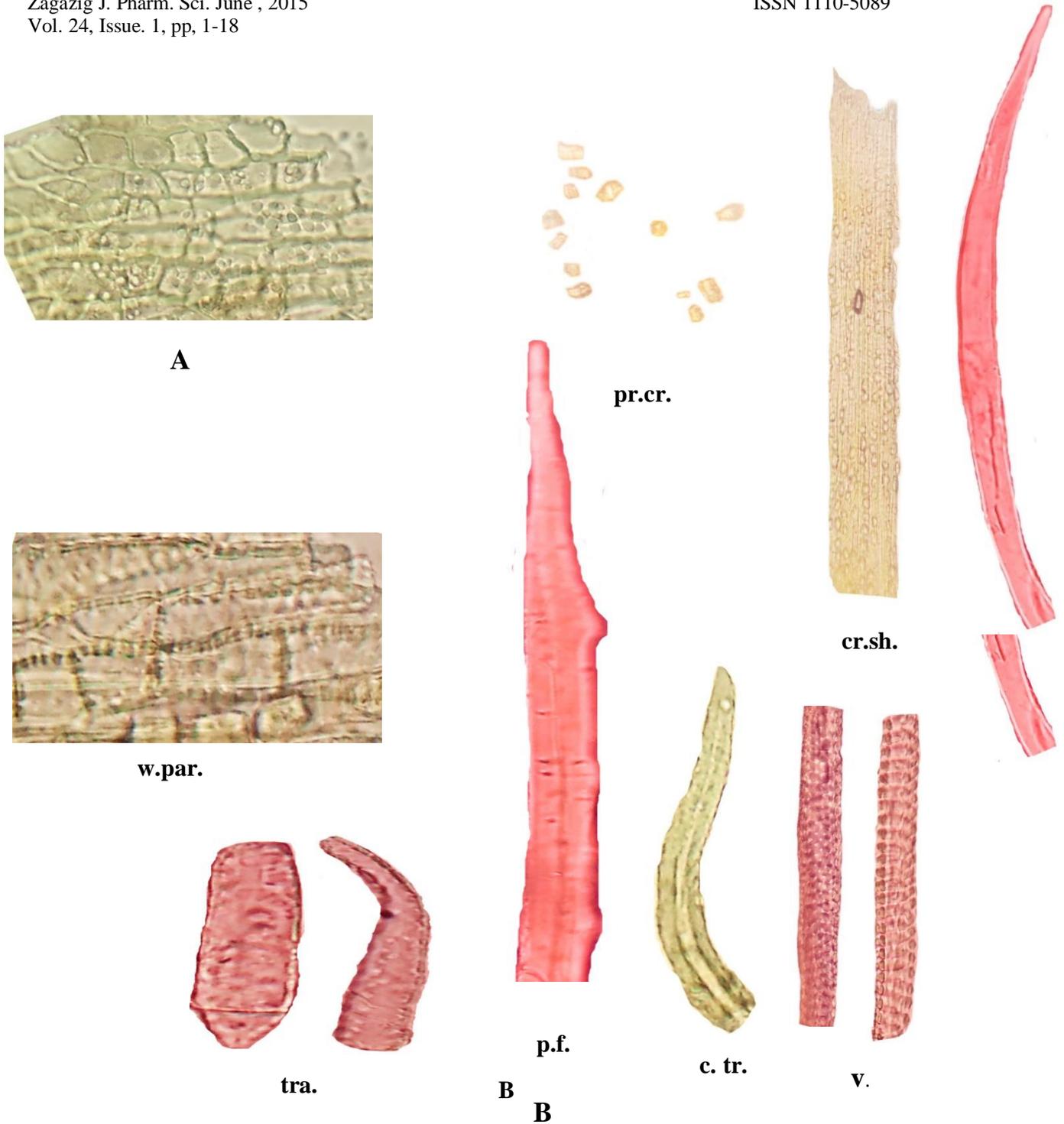


Fig. (5): Photos of The Rachis of the leaf of *Albizia lebbeck* (L.) Benth

A. Epidermal cells of rachis of pinnule. (x 1150)

B. Isolated elements of rachis of pinnae.

(cr.sh. x 208 , p.cr. x 333, p.f. x 733, tra. x 1088, v. x 146, w.f. x 833, w.h. x 450, w.par. x 1000)

c. tr., covering trichomes cr.sh, crystal sheath; p.f., pericyclic fibers; pr.cr., prismatic crystal of

The stem

Old stem:

A transverse section of the old stem (Fig.6A &6B) is nearly rounded in outline. It consists of an outer cork followed by phellogen and narrow phelloderm. The pericycle is formed of complete ring of thick lignified pericyclic fibres and small groups of sclerieds. The vascular tissue is well developed, formed of an outer phloem, inner xylem and is transversed by numerous medullary rays. The pith is narrow and parenchymatous.

The cork (Fig.6B &6C) is formed of 4 to 6 rows of tangentially elongated cells with suberized, slightly lignified walls. The phellogen (Fig. 6B) is formed of 2-4 rows of tangentially elongated arranged cells. The phelloderm (Fig.6A &6B) is formed of 7 to 10 rows of polygonal, thin-walled parenchymatous cells with narrow intercellular spaces.

The pericycle (Fig.6A, 6B &6C) is formed of complete ring of thick lignified fibers with small groups of lignified polygonal, isodiametric or elongated sclerieds with moderately wide lumen. The pericyclic fibers (Fig.6B &6C) are spindle-shaped, with acute or blunt apices, narrow lumen and thick lignified walls. Parenchymatous cells containing prismatic crystals of calcium oxalate abutting to the pericyclic fibers forming a crystal sheath. Caox measures 5-30 μ in diameter.

The vascular tissue (Fig.6A, 6B &6C) is formed of a narrow phloem and wide xylem, crossed by medullary rays. The medullary rays are narrow, usually uniseriate, rarely biseriate or triseriate. The phloem is formed of sieve tubes, companion cells, phloem parenchyma and small groups of phloem fibers with 5 to 7 fibers in each group. They are spindle-shaped with thin lignified walls, relatively wide lumens and acute apices. The xylem consists of pitted tracheids,

alternative bands of wood parenchyma and wood fibers in which xylem vessels are scattered. The vessels are lignified, being spiral or pitted. They are radially arranged either solitary or in groups of 2 to 3 vessels. The wood fibers are spindle-shaped with moderately thick lignified walls, relatively narrow lumens and acute apices. The wood parenchyma formed of somewhat elongated cells with lignified simple pitted wall. Tracheids are elongated with thick pitted walls and nearly rounded tips. The medullary rays are mostly uniseriate and formed of cellulosic, subrectangular cells in the phloem region and of rectangular, radially elongated lignified and pitted cells in the xylem region.

The pith (Fig.6A & 6B) is narrow and formed of large rounded or polygonal, lignified pitted, thin-walled cellulosic parenchyma with narrow intercellular spaces.

Numerous starch granules (Fig.6C) are scattered in the cells of the cortical tissue, wood parenchyma and pith; they are simple rounded with neither visible hilum nor striations. They measure 2-3 μ in diameter.

The Powdered Stem

The powdered stem (Fig. 6C) is yellowish-brown in colour with faint characteristic odour slightly astringent taste. It is characterized microscopically by the following:

- 1-Fragments of cork cells with suberized walls and brownish contents.
- 2-Lignified pericyclic fibers accompanied by crystal sheath.
- 3-Lignified fibers with acute or blunt apices and moderately thick to thick walls
- 4- Lignified sclerieds with wide to narrow lumen.
- 5-Fragments of tracheides showing blunt apices and moderately thick lignified walls showing rounded bordered pits.

6-Unicellular non- glandular trichomes, covered with thin warty cuticle.

7-Numerous prismatic crystals of calcium oxalate.

8- Numerous simple starch granules which are more or less rounded with indistinct hilum and stration.

The Inflorescence

I- The Calyx

A transverse section in the sepal (Fig. 7A) shows an inner and outer epidermises enclosing in between a homogenous mesophyll which is traversed in the middle by a collateral vascular bundle.

The inner epidermal cells (Fig.7C₁) are formed of isodiametric cells with straight anticlinal walls, covered with smooth cuticle and free of stomata.

The outer epidermal cells (Fig.7C₂) are similar to those of the inner but somewhat smaller in size, with straight or slightly wavy anticlinal wall and have stomata and trichomes. Stomatais of paracytic and anomocytic types. The trichomes (Fig. 7C₃) are numerous, unicellular, non-glandular and covered with thin smooth cuticle, have blunt apices, straight or bent and present on both inner and outer surfaces of the calyx.

The mesophyll (Fig. 7A) is homogenous consists of 2 to 5 layers of somewhat rounded or oval, thin walled parenchymatous cells, showing more or less wide intercellular spaces. They contain occasional prismatic crystals of calcium oxalate.

The vascular system in big veins (Fig. 7A) consists of a few lignified spiral vessels and small patches of phloem elements.

II- The Corolla

A transverse section of the petals (Fig. 7B) is showing an inner and outer epidermises enclosing in between a narrow homogenous undifferentiated mesophyll which is transversed in the middle by collateral vascular bundle.

The inner and outer epidermal cells (Fig.7 D₁ & D₂) are formed of polygonal, isodiametric cells with straight or slightly wavy anticlinal walls and covered with smooth cuticle. Stomata and trichomes are present only on outer epidermis. Stomata of paracytic and anomocytic types and trichomes (Fig.7D₃) are similar to those of sepals. The mesophyll is similar to sepals.

III- The Androecium

The filament: A transverse section in the filament tube (Fig.8A) is more or less oval in shape. It consists of outer and inner epidermises enclosing a parenchymatous mesophyll and is traversed by numerous small vasocentric vascular bundles. Transverse section of the filament (Fig.8E) is rounded in shape. It consists of an epidermis followed by a parenchymatous cortex and central vascular strand. The epidermis (Fig.8F&8G) consists of isodiametric papillosed cell at the tip of filament, axially elongated in the middle and more elongated at the base and at filament tube. All cells show straight anticlinal walls and covered with finely striated cuticle. The cortical parenchymatous cells are almost rounded and show scattered prism of calcium oxalate and starch granules.

The anther: A transverse section of the anther (Fig. 8B) consists of two anther lobes separated by the connective; each lobe encloses two pollen sacs containing pollen grains. The anther wall (Fig. 8B) is formed of an outer papillosed epidermis followed by a single row of fibrous layer. The fibrous layer (Fig. 8D) is polyhedral with lignified – bar like thickening. The pollen grains (Fig.8C) are polygonal to oval, sometimes planoconvex, yellow in colour, rarely showing germ pores and germ furrows and measuring 25-40 μ in length and 20-30 μ in diameter.

IV- The Gynaecium

The ovary: A transverse section in the ovary (Fig.9A) is nearly oval in shape with

one locule and marginal placentation. It consists of an outer and inner epidermises enclosing a parenchymatous mesophyll, and is traversed by numerous small vasocentric vascular strand. The cells of outer epidermis (Fig.9 D) are polygonal, isodiametric, with straight anticlinal wall and covered with smooth cuticle. The mesophyll is formed of rounded parenchymatous cells containing scattered prisms of calcium oxalate and starch granules.

The style: A transverse section of the style (Fig.9B) is nearly rounded in shape. It consists of epidermal cells enclosing a ground tissue which is traversed by two vascular strands. The ground tissue is formed of rounded parenchyma, and the xylem is formed of lignified spiral and reticulates vessels.

The stigma: The stigma (Fig.9C) is funnel shape in outline with slightly papillosed epidermal cells.

V- The Rachis

A transverse section in the rachis of the inflorescence (Fig.9E) is more or less rounded in outline. It shows an epidermis, parenchymatous cortex and vascular system consists of 8 separated collateral vascular bundles, each consists of phloem to outside and xylem to inside surrounding a parenchymatous pith. The epidermal cells

(Fig.9F) are polygonal, axially elongated with straight anticlinal walls covered with smooth cuticle. Unicellular non – glandular trichomes are abundant, with blunt apices and covered with thin warty cuticle. The cortex consists of 4-6 rows of thin walled parenchyma cells, showing scattered prismatic crystals of calcium oxalate and starch granules. The vascular bundle; xylem is formed of lignified spiral, pitted and reticulate vessels and the phloem is formed of thin cellulosic elements.

The Powdered inflorescence:

The powdered inflorescence (Fig. 7, 8&9) is yellowish – brown in colour with fragrant characteristic odour slightly astringent taste. It is characterized microscopically by the following:

- 1- Fragments of the epidermal cells of the calyx and corolla with straight anticlinal walls and covered with smooth cuticle, paracytic stomata and non-glandular trichomes or sometimes their cicatrices.
- 2- The fibrous layer of the anther with lignified – bar like thickening.
- 3- Numerous polygonal to oval pollen grains, rarely showing germ pores and germ furrows.
- 4- Papillosed epidermal cells of the stigma.

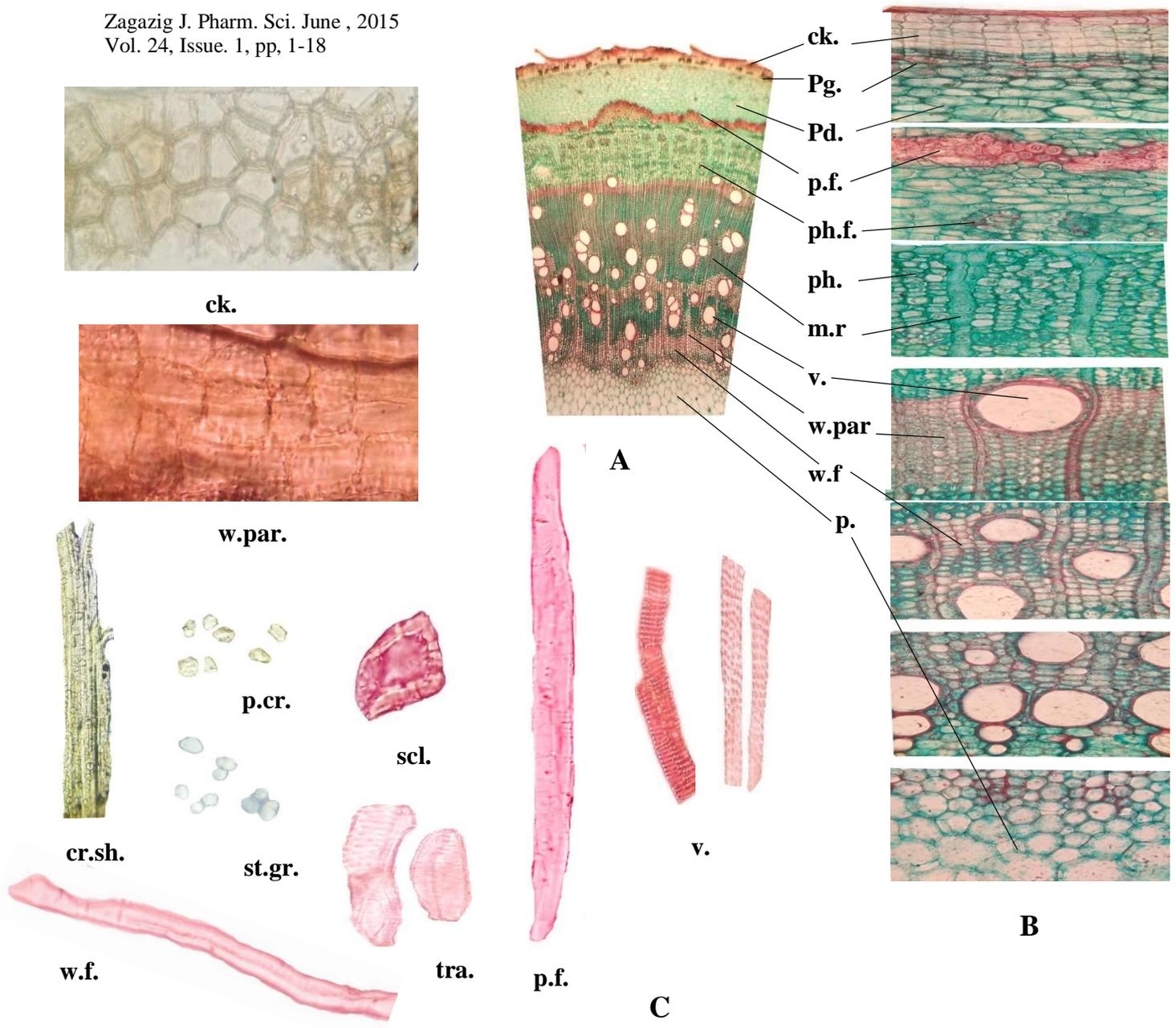


Fig. (6): Photos of The old stem of *Albizia lebbeck* L.Benth.

A. Diagrammatic transverse

(x 77)

Detailed transverse section.

(x 436)

C. Some elements of the powdered old stem .

(ck. x 500 , p.f. x 300, w.f. x 800, cr.sh. x 67, v. x 86, st.gr x 667, p.cr.

x 133 and w.par. x168)

ck., cork; cr.sh., crystal sheath; pg., phellogen; pd., phelloderm; p., pith; p.f., pericyclic fiber; ph., phloem; p.cr., prismatic crystals of caox; scl., sclerides; st.gr., starch granules; tra., tracheid; v., vessels; w.f., wood fiber; w.par., wood parenchyma .

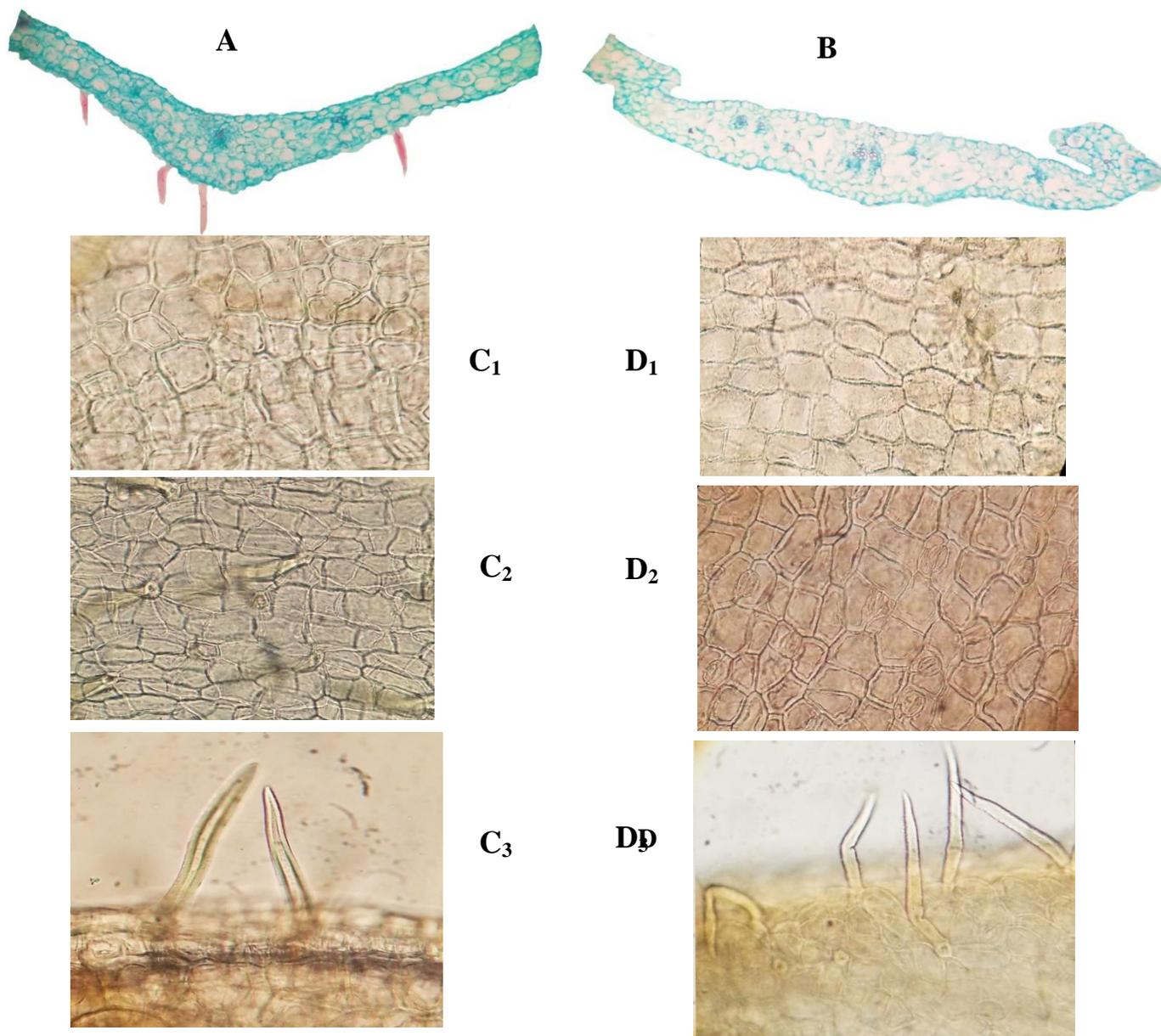


Fig. (7): Photos of The calyx and corolla of *Albizia lebbek* (L.)Benth.

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|--|---------|---|---------|
| A. Transverse section of calyx. | (x 100) | B. Transverse section corolla. | (x143) |
| C ₁ . Inner epidermis of calyx. | (x 314) | D ₁ . Inner epidermis of corolla | (x 260) |
| C ₂ . Outer epidermis of calyx. | (x 380) | D ₂ . Outer epidermis of corolla | (x 275) |
| C ₃ . Trichomes of calyx | (x 200) | D ₃ . Trichomes of corolla | (x 200) |

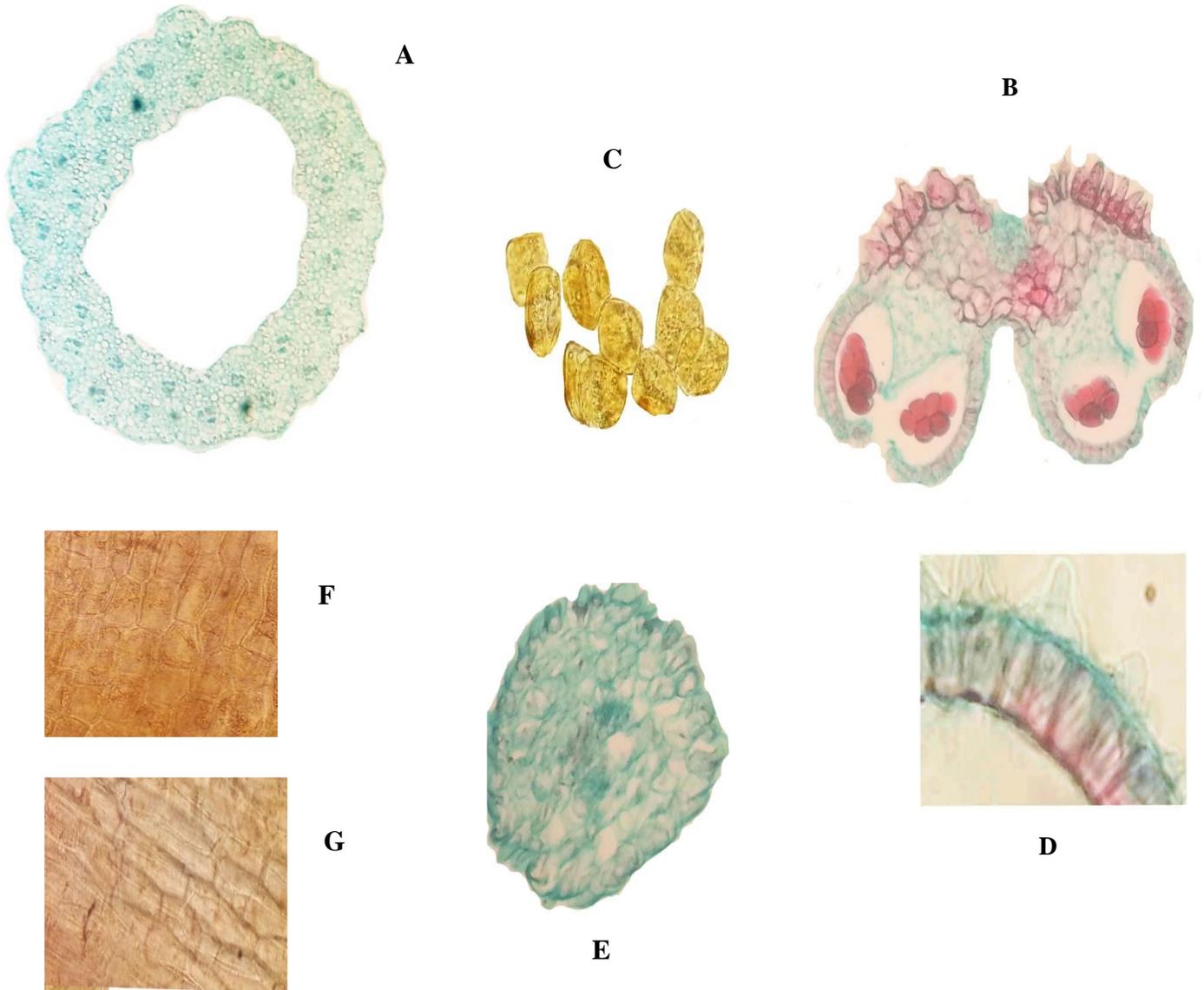


Fig. (8): Photos of The androecium of *Albizia lebeck* (L.)

- A. Transverse section in the filament tube (x 27.2)
- B. Transverse section in the Anther (65)
- C. Pollen grains (x 325)
- D. Fibrous layer of anther (180)
- E. Transverse section in the filament (x85)
- F. Epidermal cells at the tip of the filament (x 100)
- G. Epidermal cells at the middle of the filament. (x 100)

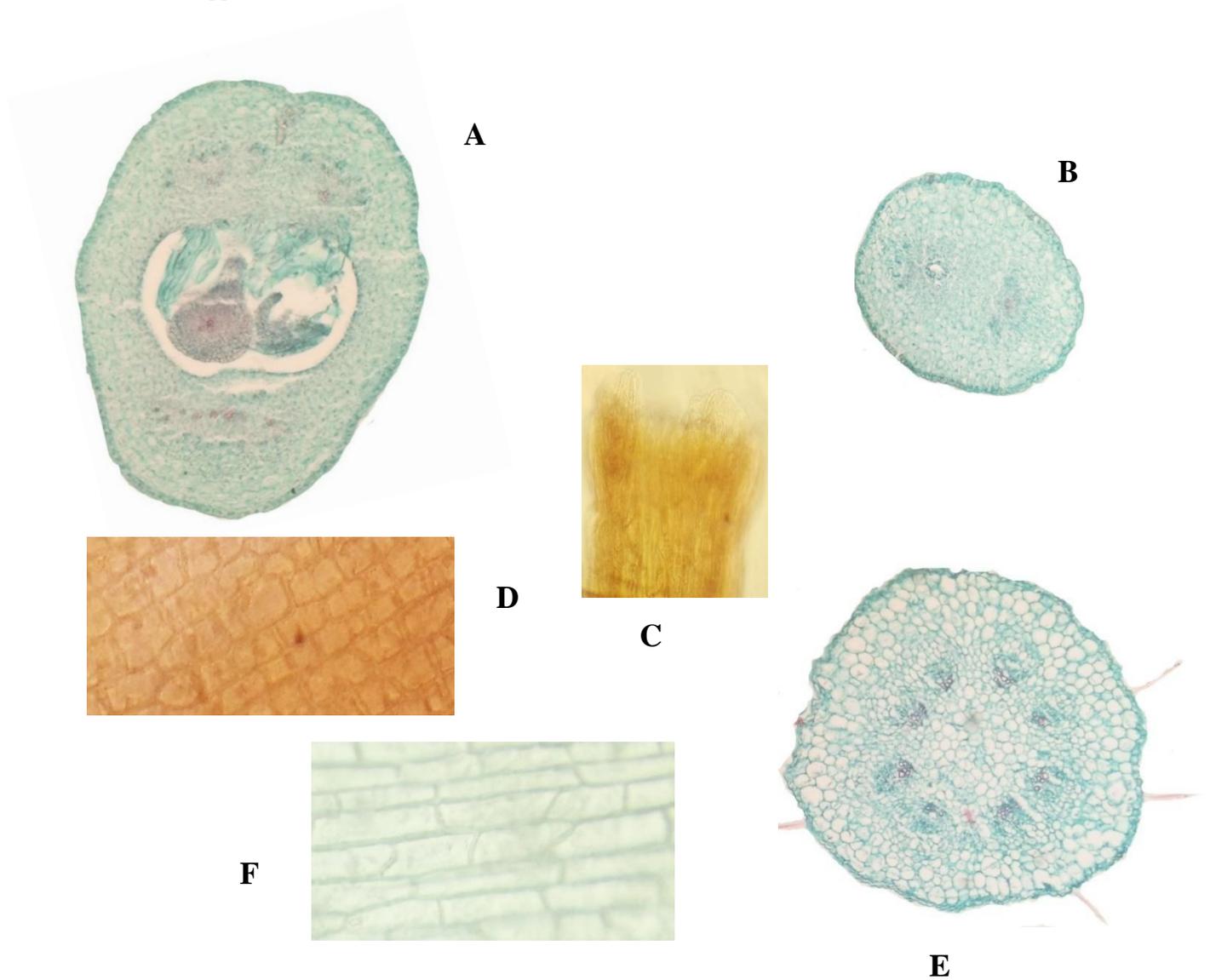


Fig. (9): Photos of The gynaecium and rachis of inflorescence of *Albizia lebeck* (L.) Benth.

- | | |
|--|---|
| A. Transverse section in ovary (x 470) | B. Transverse section in style (x 37) |
| C. Papillosed stigma (x 301) | D. Outer epidermal cells of the ovary wall (x240) |
| E. Transverse section in rachis (x 30) | F. Epidermal cells of rachis (x 781) |

Table 1: Cell dimensions of the different tissues of the leaf, stem and inflorescence of *Albizia lebbeck* (L.) Benth.

Organ	Tissue	Dimensions (μ)	Organ	Tissue	Dimensions (μ)	
1-Leaf a-Pinnule	Upper epidermal cells	L= 17-24, W= 6-12, H= 5-18.	2-Old stem	Cork	L= 10-23, W=5-10, H=9-13	
	Lower epidermal cells	L= 11-23, W= 6-11, H= 2-6.		Pericyclic fiber	L=255-1400, W=12-20	
	Upper neural cells	L=14-25, W= 6-15, H= 6-9		Vessels	D=22-39	
	Lower neural cells	L= 6-17, W= 2-6, H= 5-7		Wood fiber	L=92-146, W= 3-7	
	Stomata	L= 9-15, W= 6-10		Wood parenchyma	L=9-31, W= 9-16	
	Trichomes	W = 13- 17 L= 78-14		Tracheids	L=39-78, W=11-17	
b-Rachis of pinnule	Epidermal cells	L= 3-10, W= 3-6, H= 4-9	3-inflorescence a-Corolla	Inner epidermal cells	L=24-51, W=12-24, H=9-14	
	Trichomes	L= 78-145 W= 9-13		Outer epidermal cells	L=13-51, W=10-20, H=9-14	
	Pericyclic fiber	L=125-300, W= 7-15	b-Calyx	Inner epidermal cells	L=15-37, W=12-22, H=5-10	
	Wood fiber	L=92-146, W= 3-7		Outer epidermal cells	L=13-29, W= 10-12, H=8-12	
	Vessels	D= 12-52		Vessels	D= 7-9	
	Tracheids	L= 12-34, W= 6-17		c-Androecium	Epidermal cell of the filament	L=18-120, W= 9-14, H=18-23
				d-Gynaecium	Epidermal cells of the ovary	L=30-54, W=12-21, H= 9-14
					Epidermal cells of the style	L=82-100, W=15-20, H= 14-23
				e-Rachis	Epidermal cells	L=7-32, W=4-8, H= 7-9
					Trichomes	L= 300-1020, D= 9-17

D= diameter; H= height; L= length; W= width.

Table (2): Microscopical numerical values of the leaflets of *Albizia lebbek* (L.) Benth

The numerical value	Recorded value
1-Stomatal Index of the lower Epidermis	5.6 – 12.3
2-Vein-Islet Number	14 - 18
3-Veinlet-Termination Number	12 - 24
4-Palisade Ratio: Upper surface	10 - 12
Lower surface	7 – 9

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الدراسة العيانية والمجهريّة لنبات الببزييا لبيبيك ال بنث(العائلة البقوليه) المنزرع في مصر

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سبق ان قام الباحثون بدراسة كيميائية لنبات الببزييا لبيبيك ال بنث (العائلة البقوليه) و المنزرع في مصر و قد امكن فصل ستة مركبات استيرولية و تريبنية و مركب كحولي هيدروكربوني و اثنين من المركبات الفلافونية بالاضافة الى مركبين جديدين من المركبات الصابونية و اخر كحول سكري, كما اجريت الدراسة البيولوجية للنبات و اثبتت فاعليته كمضاد للبكتيريا و الفطريات ,لذلك أجريت في هذا البحث الدراسة العيانية و المجهرية لأوراق و سيقان و ازهار نبات الببزييا لبيبيك ال بنث (العائلة البقوليه) حتى يصبح من السهل التعرف على النبات في حالته الصحيحة أو على هيئة مسحوق.