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Morphoanatomy Studies of the Pericarp of *Lagonychium farctum* (Banks & Sol.) Bobr. Growing in Egypt

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Lagonychium farctum (Banks and Sol.) Bobr. is an erect prickly trees or shrubs. It belongs to family Leguminosae. It is used in traditional system of medicine as an astringent as well as anti-dysenteric. The present study investigates various standardized parameters such as macroscopic and microscopic characters which could be helpful in authentication of the pericarp of *Lagonychium farctum*. (Banks & Sol.) Bobr

Keyword: *Lagonychium farctum*, Prosopis, Acacia, Mimosa, Leguminosae, Pericarp, Morphoanatomy Study

1. Introduction

Genus *Lagonychium* (Prosopis) includes 45 species (tropical and subtropical). *Lagonychium farctum* (Banks & Sol.) Bobr. belongs to family Leguminosae and sub-family Mimosoideae^[1-4]. This plant has many other synonyms as *L. stephaniana* M. B., *Prosopis farcta* (Banks & Sol.) (Orth. Err. *farcata*), *P. stephaniana* (Willd Kunth ex Spreng, *Acacia stephaniana* (M. B.), *A. heterocarpa* Del., *Mimosa farcta* (Banks & Sol.) and *M. stephaniana*^[2-6]. It is used in Palestine as an astringent and anti-dysenteric^[5]. Ingestion of large amount of this plant is toxic due to presence of saponins that cause inflammation to the digestive tract and quick peristalsis^[7]. Sensor and motor nerve fibers are also affected in a serious way⁷. It is an erect prickly trees or shrubs. Leaves: compound,

bipinnate. Stipules: small or absent. Leaflets: small, narrow. Stem: with or without spines. Spines solitary or in pairs. Flowers: pentamerous, usually sessile in narrow spikes, regular, actinomorphic, hermaphrodite. Calyx: five-shortly toothed or subentire sepales. Corolla: five petals, valvate. Stamens: 10, free, short. Ovary: sessile or stalked, multi ovulate. Style: slender, filiform. Stigma: minute, terminal. Pod: turgid, cylindrical or oblong, straight, variously twisted, septa between the seeds. Mesocarp: thick and spongy. Seeds: usually ovoid compressed, albuminous^[8-10].



Fig 1 :Photo of *Lagonychium farctum*



Fig2: Picture of the fruit



Fig .3 : Diagram of the herb 0.3X

2. Taxonomy:

Lagonychium farctum (Banks & Sol.) Bobr. belongs to^{[2,1]1}:

Phylum: Angiospermae, Subphylum: Dicotyledonae, Class: Magnoliopsida, Subclass: Rosidae, Order: Fabales, Family: Leguminosae, Subfamily: Mimosoideae, Genus: *Lagonychium*, Species: *farctum* (Banks & Sol.) Bobr.

3. Materials and Methods:

A. Plant Material: The fruits of *Lagonychium farctum* (Banks & Sol.) Bobr. were collected from sandy area around Kharga Oasis, Egypt, in June 1996. The sample was identified by Prof. A. Fayed (Professor of Systematic Botany and Taxonomy, Faculty of Science, Assiut University, Assiut, Egypt). It was dried at room temperature, then reduced to fine powder. The materials used for botanical study were taken from the samples preserved in 70% ethanol containing 5% glycerin.

B. Microscopic Studies : Surface preparation, transverse section as well as powder of the pericarp were used for observation of various microscopic features.

4. Results and Discussion

A. Microscopical Characters:

The Fruit (Fig. 2, 3, 4A-C):

It is a stalked dry indehiscent pod, derived from a superior monolocular ovary with marginal placentation. The fruit is true, simple, dry, lomentum or sometimes legume. It is swollen curved or kidney-shaped, cylindrical usually 2-valved. It breaks transversely into one-seeded segments and contains up to 10 seeds. The surface is smooth, showing fine reticulations. It has a round distal end bearing a small point marking the position of the style. It is born on a short stalk arising from the ventral suture. The outer epicarp is thin, leathery to woody. Dorsal suture carries single vascular bundle and the ventral one carries two closely applied strands. Internally the fruit shows a spongy pulp diffused with the endocarp and the seeds are embedded in the pulp. It has constrictions and divided internally with weak false septa resulting in unequal compartments. The spongy pulp is pale-

brown to buff in colour. The stalk is straight, cylindrical with a somewhat rough surface, pale brown colour and measures from 7 to 10 mm in length and 1 to 3 mm in diameter. The fruits measure from 3 to 6.5 cm in length and 1 to 2.5 cm in diameter with dark brown colour, faint characteristic odour and astringent lastly sweet taste.

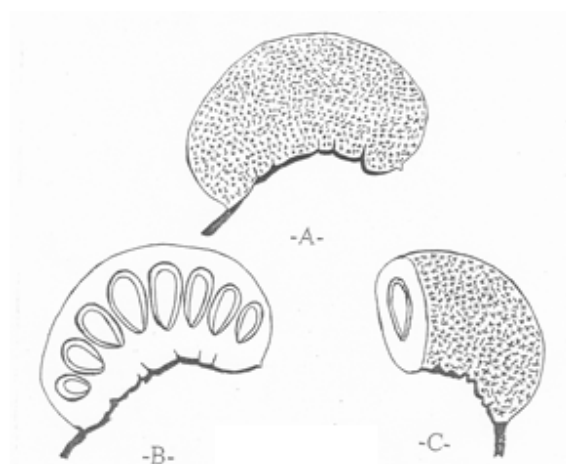


Fig. 4: Morphology of the fruit; **A**-the fruit, **B**-Longitudinal section, **C**-Transverse section. (All 0.6 X)

B. Microscopical characters of the pericarp:

1. I-The Pericarp (Fig. 5B, C):

A transverse section through the pericarp shows an epicarp of one layer and an inner parenchymatous endocarp enclosing in between a wide region of pulpy mesocarp traversed by vascular bundles. The outer zone of mesocarp is formed of parenchyma followed by a zone of sclerenchyma. The latter is lined internally by a row of collateral vascular bundles. The rest of the mesocarp shows a wide region of thin walled parenchyma lined internally by a narrow zone of sclerenchyma accompanied by a lower layer of collapsed parenchyma. The endocarp is represented by one layer of tangentially elongated cellulosic cells covered with smooth and thin cuticle.

2. A-The epicarp (Fig. 5A, C, 6A):

It is formed of one row of tangentially elongated cells as seen in the transverse section. In surface view (Fig. 5A, 6A): The cells are polygonal,

isodiametric with straight anticlinal walls, covered with smooth, thin cuticle and measure from 10 to 12 to 14 μ in diameter. They show few paracytic stomata. Hairs are not observed.

3. B-The Mesocarp (Fig. 5B, C, 6B, C):

The outer zone of the mesocarp is formed of oval to rounded parenchyma with large intercellular spaces and arranged in 5-12 rows which are brown due to presence of numerous tannin bodies which stain olive green with ferric chloride T.S. The second layer of the mesocarp is formed of sclerenchyma layer which is arranged in about 8 to 12 rows of sclereids with pitted lignified walls and wide lumina with numerous pits.

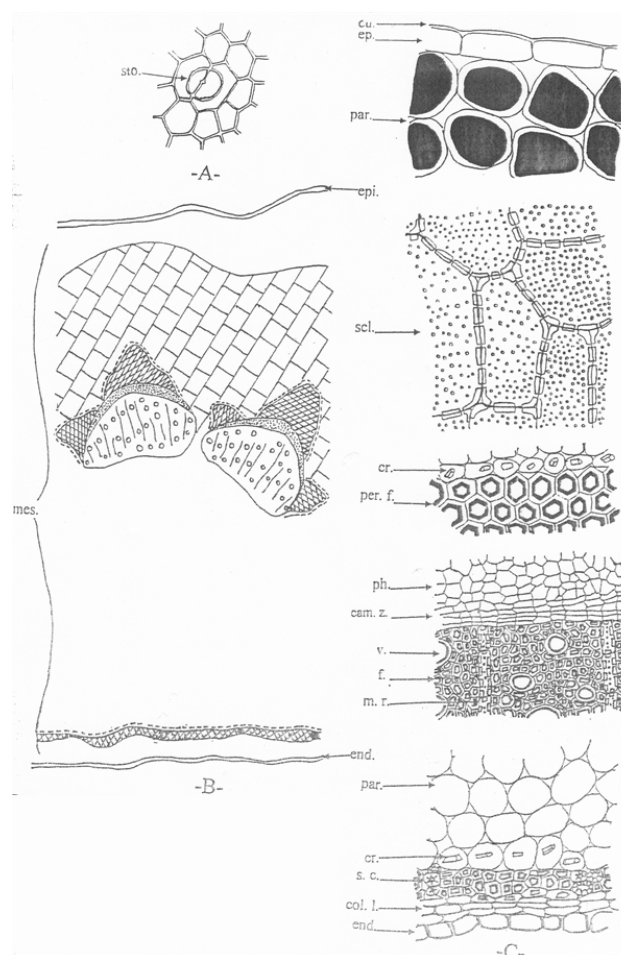


Fig. 5 : The pericarp; **A**. Surface preparation, **B**. Diagrammatic transverse, **C**. Detailed transverse section (**A**, **C** X 500 and **B** X 50)

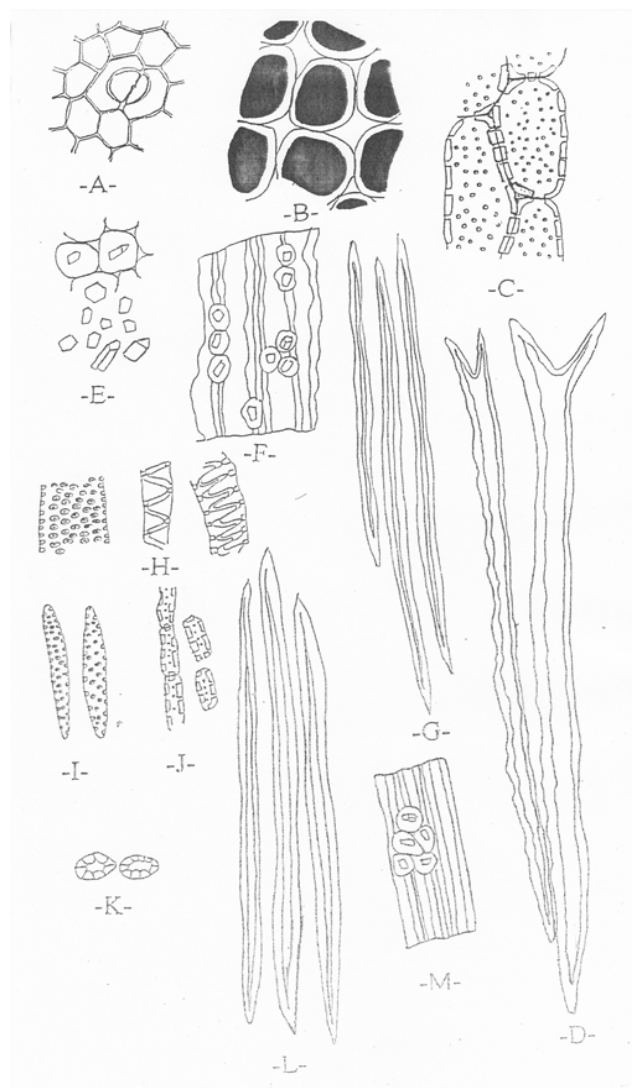


Fig. 6 : The pericarp powder; **A.** Epicarp, **B.** Metacarpal parenchyma, **C.** Metacarpal sclerenchyma, **D.** Pericyclic fibers, **E.** Prisms of calcium oxalate crystals, **F.** Crystal sheath of the pericycle, **G.** Wood fibers, **H.** Xylem vessels, **I.** Tracheids, **J.** Medullary rays, **K.** Stone cells, **L.** Fibers of the innermost layer of the mesocarp, **M.** Crystal sheath of the mesocarp (All X 500)

They are oval or subrectangular to somewhat isodiametric in shape and measure from 60 to 110 to 180 μ in length and 35 to 50 to 60 μ in width. The vascular bundles show an outer pericycle formed of interrupted sclerenchyma. This sclerenchyma consists of lignified fibers and parenchyma. The pericyclic fibres consist of 2 to 4 arms of fibers over each bundle and arranged in 2 to 10 rows. They have moderately thick, slightly lignified tortuous walls, wide lumina and

forked apices. They are surrounded by parenchyma containing prisms of calcium oxalate forming a crystal sheath. Calcium oxalate prisms measure from 10 to 14 to 18 μ in diameter. The pericycle fibers measure from 280 to 360 to 420 μ in length and 8 to 10 to 16 μ in width. The phloem is formed of soft elements viz. sieve tubes, companion cells and phloem parenchyma. It is lined internally by a narrow cambial zone. The xylem consists mainly of spiral, pitted and reticulate lignified vessels being about 10 to 23 to 36 μ in diameter. Few tracheids have lignified walls, elongated with blunt apices. They show simple and bordered pits and measure from 60 to 70 to 80 μ in length and 8 to 11 to 14 μ in diameter. Wood fibers have thick, lignified, walls, narrow lumina and acute apices. They measure from 120 to 180 to 190 μ in length and 6 to 8 to 10 μ in width. The medullary rays are uniseriate to biseriate with lignified walls and pitted lumina. They measure from 20 to 30 to 40 μ in length and 8 to 10 to 12 μ in width. The rest of the mesocarp shows a wide region of thin walled parenchyma which are oval to rounded in shape with thin cellulosic walls. They measure from 14 to 27 to 40 μ in diameter. The sclerenchyma layer is formed of 1 to 4 rows of fibers with thick lignified walls, narrow lumina and acute apices. They are interrupted by few stone cells which are oval to rounded in shape with moderately thick lignified walls and moderately wide lumina. They measure from 16 to 20 to 24 μ in diameter. The fibers are surrounded by parenchyma containing prisms of calcium oxalate forming a crystal sheath. Calcium oxalate prisms measure from 6 to 9 to 12 μ in diameter. The fibers measure from 220 to 260 to 300 μ in length and 8 to 10 to 12 μ in width. The innermost layer of the mesocarp consists of 1 to 2 layers of thin walled collapsed parenchyma abutting on the endocarp.

C-The Endocarp (Fig. 5B, C):

It is formed of one layer of cubic to rectangular cellulosic cells with slightly thick radial and outer tangential walls. They measure from 14 to 18 to 22 μ in length and 8 to 12 to 16 μ in width.

D-The Powdered Pericarp (Fig. 6):

The dried powdered pericarp is yellowish-brown in colour with faint characteristic odour and astringent lastly sweet taste. The following are the most diagnostic microscopic features of the powder (Fig. 6):

1. Fragments from the epicarp consist of polygonal or isodiametric cells with straight anticlinal walls and covered with thin, smooth cuticle. The fragments bear few paracytic stomata. Hairs are absent.
2. Fragments from the metacarpal parenchyma which are oval to rounded with large intercellular spaces.
3. Fragments from metacarpal sclerenchyma which are elongated, oval or subrectangular, to somewhat isodiametric in shape. Sclereids have pitted lignified walls and wide lumina with numerous pits.
4. Lignified pericycle fibers with moderately thick, slightly lignified tortuous walls, wide lumina and forked apices which are accompanied by a crystal sheath.
5. Few tracheids which are elongated showing lignified pitted walls and blunt apices. The pits are both simple and bordered.
6. Spiral, pitted and reticulate lignified xylem vessels.
7. Wood fibers have lignified, thick walls, narrow lumina and acute apices.
8. Medullary rays showing lignified walls and pitted lumina.
9. Fibers of the mesocarp with thick lignified walls, narrow lumina and acute apices. They are accompanied by a crystal sheath.
10. Few stone cells oval to rounded in shape, with moderately thick lignified walls and moderately wide lumina.
11. Free and scattered prisms of calcium oxalate crystals.
12. Absence of trichomes and starch grains.

5. Conclusion

From over present study entitled, Morphoanatomy Studies of the Pericarp of *Lagonychium farctum* (Banks & Sol.) Bobr. Growing in Egypt, it could be helpful in authentication of the pericarp. Moreover, it is helpful in the identification of powdered drug prior using in any herbal formulations.

6. Acknowledgement

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