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Pharmacognostical Studies on Flower of *Tribulus terrestris* L.

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Tribulus terrestris L. (family Zygophyllaceae) is a prostrate branched herb. The stems have monopodial branching and carry opposite compound paripinnate leaves and yellow simple flowers. The fruit is schizocarpic. The present paper deals with comprehensive pharmacognostical studies on flower part of this plant, including macroscopical and microscopical studies of flower. This will help in the identification of powder drug prior using in any herbal formulations

Keyword: *Tribulus terrestris*, Zygophyllaceae Pharmacognostical Study.

1. Introduction

The genus *Tribulus* belongs to family *zygophyllaceae* comprises approximately 25 species which grow as prostrate hairy herbs in tropical and warm regions^[1,2]. *Tribulus terrestris* L. (Zygophyllaceae) (Fig. 1) is commonly known as devil's thorn, cat head, puncture vine, goat head and caltrop^[3]. It is a herbaceous, annual, prostrate or semierect, diffusely branched herb^[4]; native in dry and sandy districts in South Europe to Central Asia and in tropical and South Africa^[5], growing in India, other warm countries such as Ceylon^[6], desert plains, waste ground, weed of cultivation and Mediterranean region^[1]. It is used in folk medicine to increase spermatogenesis, for treatment of eye troubles, edema, abdominal distension, leucorrhea and impotence, as aphrodisiac, galactagogue, anti-inflammatory, antidiarrheal and diuretic^[4].



Fig. 1: Photo of *Tribulus terrestris* L.

2. Materials and Methods:

2.1 Plant material: The flower of *T. terrestris* was collected during the flowering and fruiting stage in October 2004 from the green areas of Minia University Campus, Minia, Egypt. A voucher specimen of the plant is deposited in the Herbarium of Faculty of Pharmacy, Minia University, Egypt (Minia-04-Mar-TT).

2.3 Microscopic studies:

Surface preparation and powder of the flowers were used for observation of various microscopic features.

3. Results and Discussion

3.1 Macroscopical study:

The flower (Fig. 1 & 2) is pedicellate; pedicel 0.5 to 1.5 cm, shorter than the opposite leaf. Small, 1.2 to 1.5 cm in diameter, actinomorphic (regular), hermaphrodite (bisexual, perfect), pentamerous, hypogenous, solitary, and pale yellow in colour. The flowers of *Tribulus terrestris* Linn. possess the floral formula (Fig. 2):

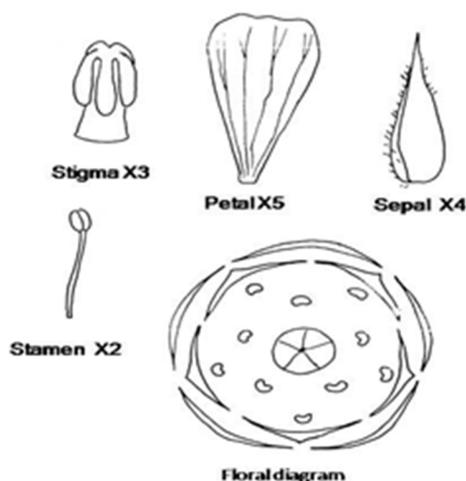


Fig. 2: Sketch of the flower

3.2 The calyx:

It is formed of 5 free sepals, 3-5 mm, pale green in colour, more hairy on the lower surface, and lanceolate in shape.

3.3 The corolla:

It is formed of 5 free obovate petals, with broad sinuous apex, 0.6-1 cm, and yellow in colour.

3.4 The androecium:

It is formed of 10 free stamens in two whorls, filament is slender, and anthers are small, and perfect.

3.5 The gynoecium:

It is formed of a superior, syncarpous, 5 carpellary, 5 locular, lobed and sessile ovary with one ovule in each locules arranged on axile placenta and anular, lobed stigma.

3.6 Microscopical study:

1-The calyx: (Fig. 3 & 4)

3.6.1 The upper (inner) epidermis:

The inner epidermis of the calyx, in surface view, consists of polygonal, usually elongated, sometimes isodiametric cells, with slightly wavy anticlinal walls and covered with smooth cuticle. The cell measures about 50 to 140 μ in length and about 30 to 50 μ in width. Anomocytic stomata surrounded by 4 to 5 cells are present and measuring 15 to 20 μ in diameter and 20 to 25 μ in length.

3.6.2 The lower (outer) epidermis:

The outer epidermis of the calyx, in surface view, consists of polygonal, usually elongated, sometimes isodiametric cells, with nearly straight anticlinal walls and covered with smooth cuticle. The cell measures about 30 to 70 μ in length and about 20 to 30 μ in width. Anomocytic stomata surrounded by 4 to 6 cells are present and measuring 15 to 20 μ in diameter and 15 to 20 μ in length, as well as numerous nonglandular, unicellular hairs measuring from 220 to 940 μ in length and from 20 to 30 μ in width.

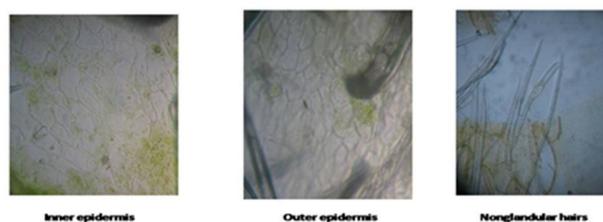


Fig. 3: Photos of the calyx

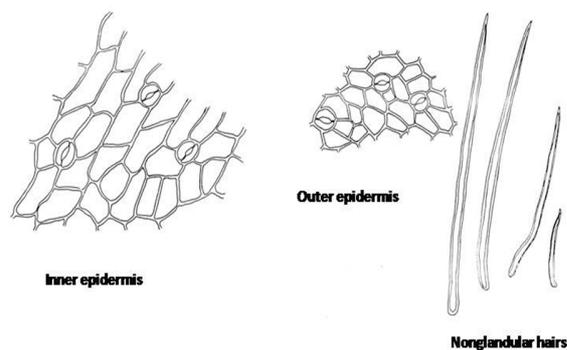


Fig. 4: Sketch of the calyx

3.7 The corolla: (Fig. 5 & 6)

The upper epidermis:

a. The apical region:

The cells are polygonal and isodiametric in surface view being axially elongated with sinuated anticlinal walls, covered with smooth cuticle. They measure about 60 to 120 μ in length and about 20 to 30 μ in width. Small prisms of calcium oxalate are present measuring about 10 to 20 μ in length and about 10 μ in width.

b. The middle region:

The cells are similar to those of the apical region, but being larger in size and the walls are less sinuated. They measure about 60 to 150 μ in length and about 20 to 40 μ in width. Small prisms of calcium oxalate are present measuring about 10 to 20 μ in length and about 10 μ in width.

c. The basal region:

The cells are similar to those of the apical region, but larger in size, more elongated and the walls are slightly sinuated. They measure about 90 to 150 μ in length and about 20 to 40 μ in width. Small prisms of calcium oxalate are present measuring about 10 to 20 μ in length and about 10 μ in width.

3.7.1 The lower epidermis:

a. The apical region:

The cells are polygonal, axially elongated with sinuated with wavy anticlinal walls, covered with

smooth cuticle. They measure about 50 to 110 μ in length and about 30 to 40 μ in width. Small prisms of calcium oxalate are present measuring about 10 to 20 μ in length and about 1 μ in width.

b. The middle region:

The cells are similar to those of the apical region, but being larger in size and the walls are less sinuated. They measure about 60 to 100 μ in length and about 20 to 30 μ in width. Small prisms of calcium oxalate are present measuring about 10 to 20 μ in length and about 10 μ in width.

c. The basal region:

The cells are similar to those of the apical region, but more elongated and the walls are slightly sinuated. They measure about 70 to 110 μ in length and about 20 to 40 μ in width. Small prisms of calcium oxalate are present measuring about 10 to 20 μ in length and about 10 μ in width.

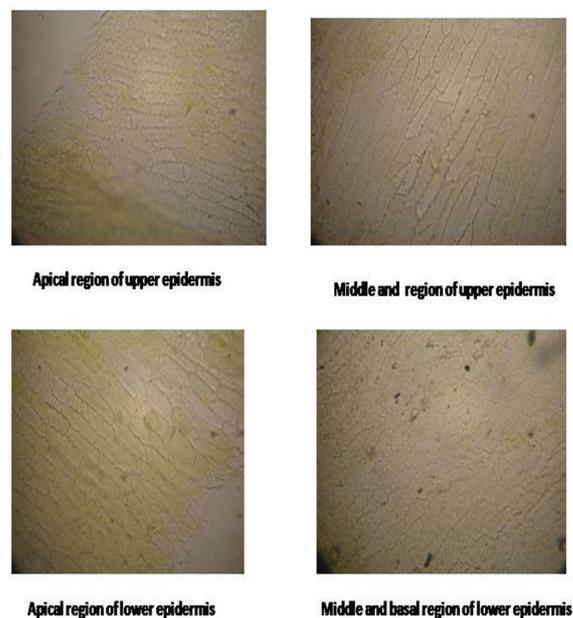


Fig. 5: Photos of the corolla

3.8 The androecium: (Fig. 7 & 8)

3.8.1 The fibrous layer of anther:

The epidermis of the fibrous layer of anther in surface view consists of polygonal, isodiametric

cells with bar-like thickening. They measure about 40 to 110 μ in length and about 10 to 30 μ in width.

3.8.2 The pollen grain

The pollen grain is spherical in shape, grey in color with reticulated surface. It measures about 60 to 70 μ in diameter.

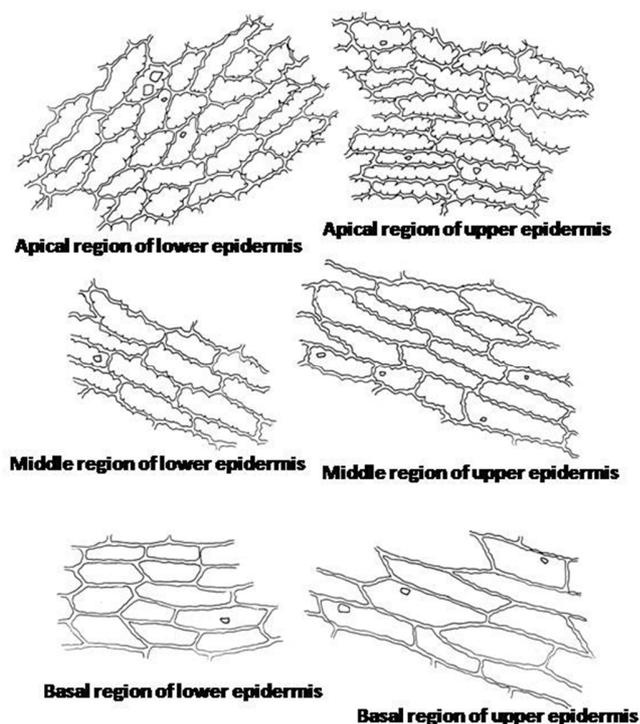


Fig. 6: Sketch of the corolla

3.8.3 The filament

The epidermis of the filament appear in surface view formed of polygonal, axially elongated cells with straight anticlinal walls covered with smooth cuticle and measuring about 70 to 90 μ in length and about 10 to 30 μ in width.

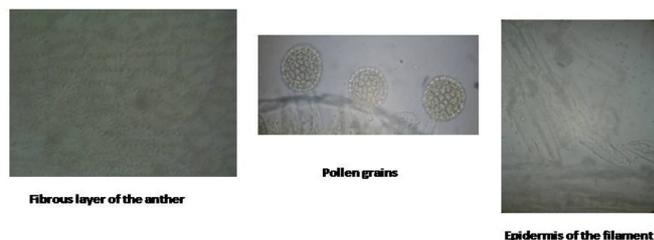


Fig. 7: Photos of the androecium

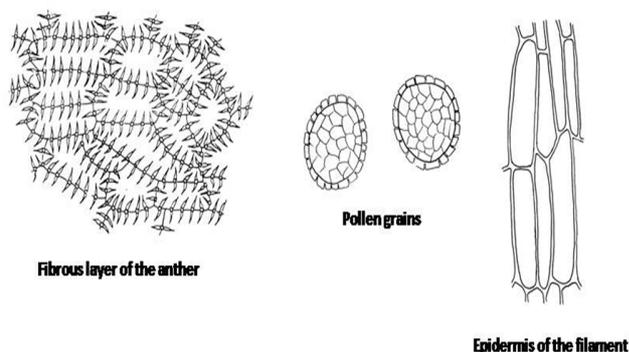


Fig. 8: Sketch of the androecium

3.9 The gynaecium: (Fig. 9 & 10)

3.9.1 The ovary

The epidermis of the ovary appears in surface view to consist of polygonal, isodiammetric cells covered with smooth cuticle measuring from 50 to 80 μ in length. Nonglandular, unicellular hairs are present on the epidermis of the ovary measuring from 520 to 880 μ in length. Cluster crystals of calcium oxalate are also present in the cells of the ovary measuring from 30 to 40 μ in diameter.

3.9.2 The stigma:

The epidermis of the stigma is consisting of papillosed cells. The papilla measures about 70 to 90 μ in length and 10 to 30 μ in diameter.

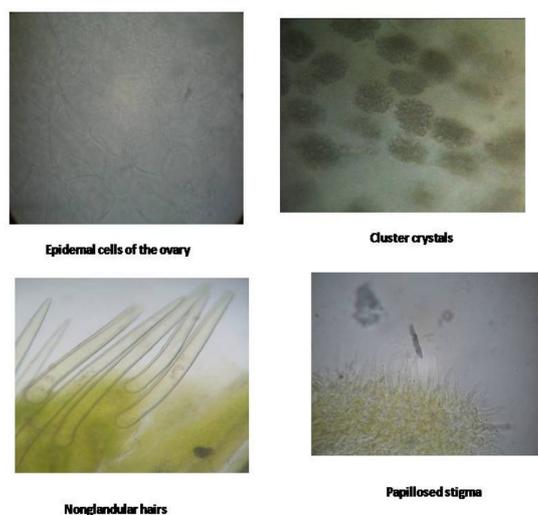


Fig. 9: Photos of the gynaecium

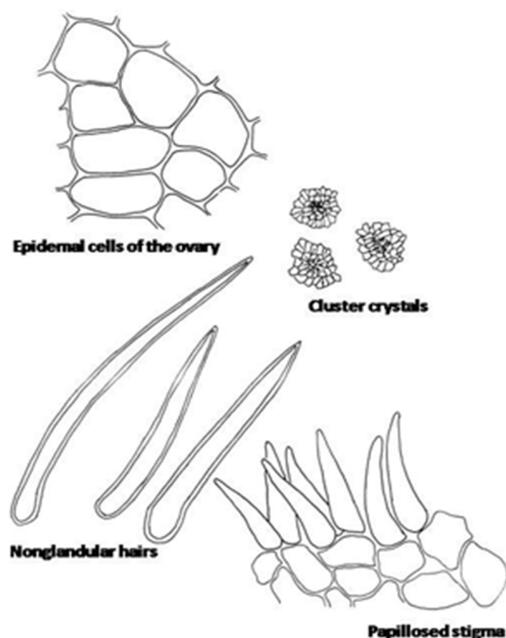


Fig. 10: Sketch of the gynaecium

4. Conclusion

In conclusion, the microscopic studies on the flowers of *Tribulus terrestris* L. can assist as a relevant source of information and contribute towards the standards to dispose the quality and identity of this plant in future exploration.

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