

# Characters anatomy of *Corchorusolitorius*L. from Malvaceae family cultivated in Iraq

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## ABSTRACT

The current study aims to study the anatomical characteristic of epidermal cells, indumentum and cross sections of stems, leaves, petioles, fruits and seeds of *Corchorusolitorius* from Malvaceae family, which collected from the herbal garden of AL-Rashidia city north of Baghdad. The anatomical study showed important characteristics can assessing to recognition the morphological characteristics which can be used to cultivated and increase the *Corchorusolitorius* crop in Iraq because of its high medical and nutritional importance of this species. The most important characteristics identified during the process of studying cross sections of plant parts are the stem is circular shape consists from uniseriate epidermis covered by cuticle and the cortex in addition the vascular bundles consist of xylem and phloem, As for the leaf epidermis appear stomata anisocytic shape and many glandular trichomes diffuse in the surface of epidermis, the head of this trichomes consist from multicellular cells, this is an important taxonomic characteristic for distinguishing between species within one genus and the upper epidermis consist from large vacuole also the mesophyll showed numerous prismatic crystals diffuse in the cells, the midrib of leaf showed that the shape of the whole section like flask shape and from the upper side the upper epidermis and part of cortex constitute special shape like as the camel hump and under it located big cavity or known specialized schizogenous intercellular spaces also this characters considered special taxonomic feature to distinguished between the species, the vascular bundle central located under the cavity crescent shape include xylem and phloem. The cross sections of petiole horseshoe and many unicellular and uniseriate trichomes spreader on the epidermis of it.

**Key words:** Anatomical study, *Corchorusolitorius*, Malvaceae family.

## INTRODUCTION

*Corchorusolitorius*, a shrub from the family Malvaceae, known as many local names like as Jew's mallow [1], tossa jute, krinkrin, bush okra, molokhia, and West African sorrel [2]. *Corchorusolitorius* is an annual crop grows usually in the lowland tropics, start from warm temperate zones through the tropical desert to wet forest zones [3]. The fresh leaves are used to eat as a soup and the dried leaves are used for tea or used in folk medicine as a medicinal herb to treatment some diseases like diuretic, purgative, dysentery, enteritis, fever, pectoral pains, tumors, also the young fruits used as a vegetable [4]. Most of the countries like India, Bangladesh and other Asian countries make Jute from phloem fibers of the bark tissue of *Corchorusolitorius* by the retting way and the phloem fibers are golden and silky with a length of up to 3 meters and with a diameter of 2.4  $\mu\text{m}$  to obtain fine fibers to use in making yarn twine, knitting of carpets or making bonds [5,6]. The aim of this study recognition the anatomical characters of the *Corchorusolitorius* because of we can in the future grown this species in a floating system with nutrient solution and can produce smaller leaves, and this consider interesting for the fresh cut leafy vegetable products in Iraq, so it is necessary to study the internal tissue and all the parts in this tissue to can know the structure of the cell and

tissue in this species and how can take care of it and reproduction due to its nutritional and medical importance, so some chemical and molecular studies have been conducted using this plant and no anatomical study has been carried out for it. Therefore, the research lacks the sources that support the results contained therein, also, this work considered the first anatomically work in Iraq.

## METHODS AND MATERIALS

### Collection and authentication of plant material

*Corchorusolitorius* plant was collected from the herbal garden at AL-Rashidiya city north of Baghdad (Latitude of Rashidiya: 33, 5528 (3333'10.080"N), Longitude of Rashidiya: 44, 3725 (4422'21.000"E)) at April 2018. The plant material was identified and authenticated by Flora of China [7] (Fig. 1).

### Preservation the samples

The fresh samples of the stem and leaf are kept in formalin acetic acid (FAA) which was prepared according to [8] for 24-48 hours then preserved in 70% alcohol until the date of experiments.

### Study of leaf epidermis

Peeling the epidermis of the leaf was done by mechanical scraping using the razor blade, followed by washing with distilled water and putting in 1% sodium hypochlorite for 10-20 min to remove the

chlorophyll pigments, then washed off with distilled water, dehydrated by ethanol 70% and put on the slides and mounted by cover slides to fix the type and shape of complex of stomata, The epidermis was prepared followed [9].

### Study the sectioning samples

For doing sectioning parts of stem, leaf, petiole, fruit and seed by hand section, the procedure was performed according to [10], the fresh material of it was fixed in formalin acetic acid alcohol solution (FAA) at 48 hours and changed the solution after this time and put in the (70%) ethanol, then sectioned on and stained by a razor blade into thin and small pieces (4-6 cm) then putting in 0.5% sodium hypochlorite for 5 mint to clear the tissue and remove the chlorophyll pigment then putted on the tube contain drop of 1% Safranin mixed with ethanol 70% for 30-45 minute finally putting on the slide and mounted by cover slides and fixed by Olympus KRÜSS light microscope then photographed using AmScope camera.

## RESULT AND DISCUSSION

### Cross section of stem

The shape of outline stem is circular shape, the cross section of stem consists from uniseriate epidermis covered by cuticle after it narrow layer of the cortex consist from 2 layers of collenchyma tissues and several rows of parenchyma tissues. Vascular bundles are open and collateral consist from xylem and phloem located between them the vascular cambium and covered by bundle cup fiber from the phloem side, also the perivascular fiber surrounded the vascular bundle from outside, according to [11] stem anatomy of *Corchorusolitorius* shows significant enhancement in fiber zone, Quality, and the number of fiber bundles. pith located in the center of stem contain from parenchyma cells of isodiametric cells throw it ordinary schizogenous intercellular space. (Fig.s1).

### Study of leaves

In the surface view of leaf the epidermis consist from the stoma complex, the shape of stomata was anisocytic type that's mean have three subsidiary cells around the guard cells, two of the cells large in size and the other one is small, the guard cells kidney shape and the anticlinal walls of epidermal cells were winding to straight, also appear many glandular trichomes on the leaf epidermis the glandular trichomes consist from multicellular head sit on the short stalk (Fig. 2), this is an important taxonomic characteristic for distinguishing between species within one genus [12].The cross section of leaf consist from the upper and lower uniseriate epidermis. the upper epidermis covered by cuticle with the thickness ranging from 3.1 $\mu$ m, also the cells of upper epidermis very large ovule shape

interspersed with them large vacuole , the thickness of upper epidermis was ranged from 55.5  $\mu$ m, while thickness of lower epidermis ranged from 30.4  $\mu$ m and the cells smaller than upper cells. The mesophyll consists from palisade layers and spongy layers. The thickness of palisade layers was 173.5  $\mu$ m and the thickness of spongy layers was 53.7  $\mu$ m. The mesophyll of the species showed numerous prismatic crystals diffuse in the mesophyll (Fig.3)The cross-section of midrib region showed that the shape of the whole section like flask shape and from the upper side the upper epidermis and part of cortex constitute special shape like as the camel hump and under it located big cavity or specialized schizogenous intercellular spaces, this is also an important taxonomic characteristic that distinguishes this species from others [12].the vascular bundle central located under the cavity, open, collateral and crescent shape ranged to 185.5  $\mu$ m include xylem with variable size of vessels ranged by 11.6-24.1  $\mu$ m and phloem (Fig.4).

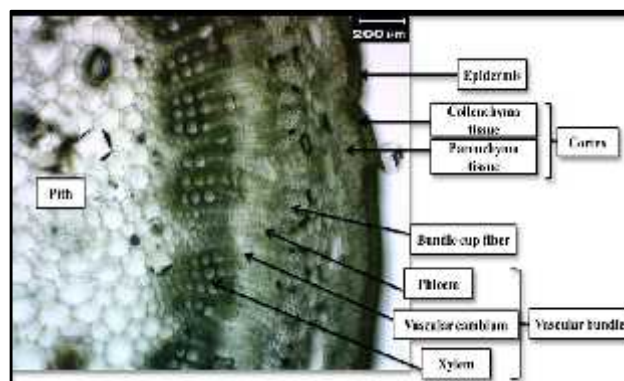


Figure 1: Cross section of stem in the species *Corchorusolitorius*.

### Cross section of petiole

The cross sections of petiole horseshoeshape, the epidermis was uniseriate covered with cuticle, the average thickness of it 1.7  $\mu$ m and many unicellular and uniseriate trichomes spreader on it, the average thickness of petiole epidermis reached to 14.6  $\mu$ m. below the epidermis represented the cortex, the average thickness of cortex ranged from 36.2  $\mu$ m. The vascular bundles ovule in shape, consist of 4 bundles the big one located in the center of pith and the three others smaller and located on the sides of the big bundle, each bundle consist from xylem and phloem (Fig.5).

### Cross section of fruits and seeds

The shape of the fruit is spindle, dehiscent and divided into transverse sections through five valves, this agrees with [13].The cross-section of fruits that appear to consist from the outer layer which is often edible in most of fruits well known the pericarp, which is the tissue that develops from the ovary wall of the flower and surrounds the seeds. the ovary or the seeds shown in (Fig. 6).

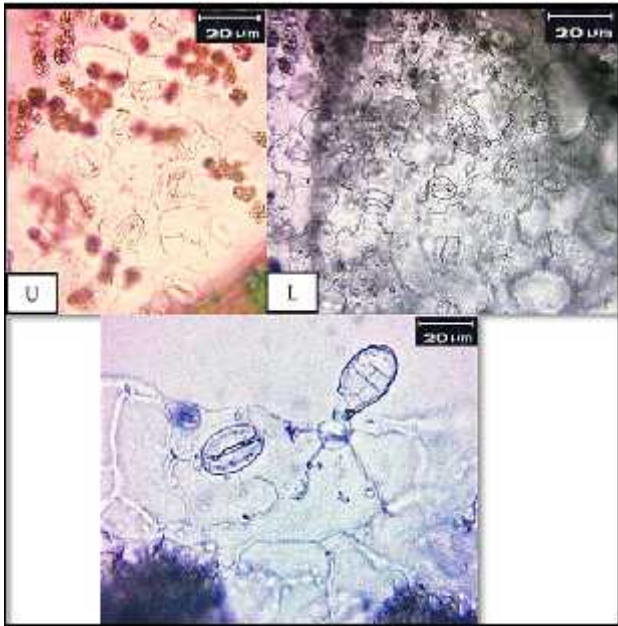


Figure 2: Surface view of epidermis in the species *Corchorusolitorius*.

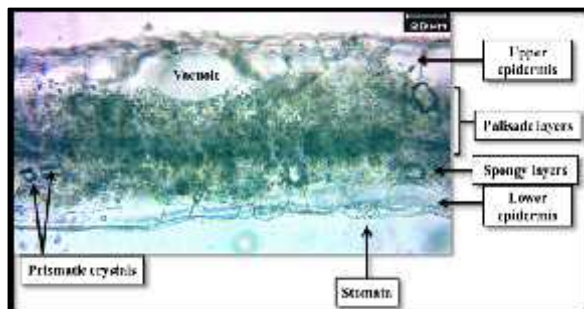


Figure 3: Cross section of leaf blade in the species *Corchorusolitorius*.

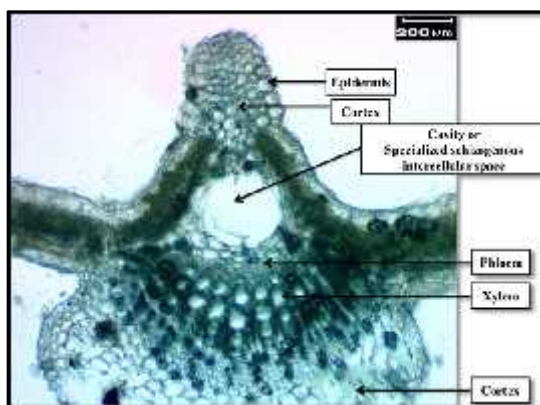


Figure 4: Cross section of midrib of leaf in the species *Corchorusolitorius*.

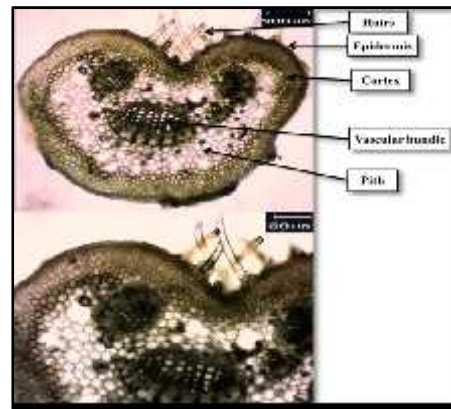


Figure 5: Cross section of petiole in the species *Corchorusolitorius*.

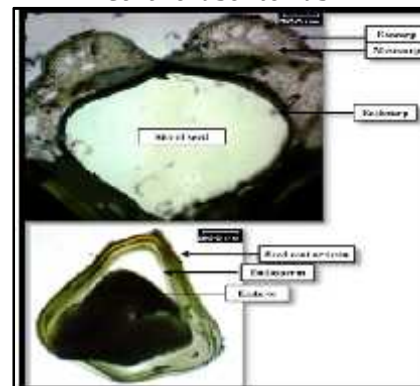


Figure 6: Cross section of fruit and seed in the species *Corchorusolitorius*.

## CONCLUSION

The cross-section of in fleshy fruits consist from the outer layer pericarp which is often edible in most of fruits, the pericarp is typically made up of three special layers, the epicarp or exocarp, the mesocarp and the endocarp and the cross section of seeds appear three basic parts, embryo, endosperm and seed coat or testa, the testa is a tough, hard and protects the seed from fungi, bacteria and insects.

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