

Anatomical study of the vegetative parts and seeds of *Vitex agnus-castus* plant

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Abstract:

The species *Vitex agnus-castus* is an important medicinal plants and it is one of the cultivated and dicotyledon plants in Iraq. The anatomical of stem, petiole, midrib area, epidermis, veins, type of leaf stomata and seeds were studied by light microscope. In this research, shows the knowledge of anatomical characteristics of the studied plant, showing its importance as taxonomic characteristics through the sections of the stem, petiole, the midrib and the petals.

Keywords: *Vitex agnus-castus*, Anatomy, Stem, Petiole, Midrib

INTRODUCTION:

Virex agnus-castus is called chaste tree or Monk's pepper or Abraham's balm. It is a tree up to 12 to 14 meters speedy growing, many branches of its base as well as their leaves palmately grey silver and its leaflets 5-7 and their flower apical, a small, clustered with a small black fruit in a half-centimetre radius (2).

The tree can tolerance a temperature of 40-45 °c that bears frost and exposure to direct sunlight, and it is also well-tolerant to the dryness and wind, you need a deep moist, well-spent soil and bear salinity up to 5.000-6.500 ppm, cultivated for decoration in gardens, parks and streets used for the generation of menstruation and treatment of epilepsy (3).

MATERIALS AND METHODS

Preparation of epidermis

The current study relied on fresh samples collected from the field directly during research in the areas of Baghdad, which included gardens and public parks as well as nurseries located within the areas of different location in Baghdad. The mentioned species diagnosis by using the taxonomy keys, Arabic and global flora as well as internet references. Fresh parts of the stem, petiole and leaf were taken from specific vegetation areas and the samples were cut by 2-3 cm and from the middle of each part of the flowering plant [21].

After fixating by formalin acetic acid alcohol (F.A.A.) solution for 24 hours at room temperature according to [22] then wash in the alcohol 70% concentration to remove traces the fixative solution then stored in alcohol with the same concentration in the freezer until it was used to prepare the anatomical sections of the plant parts as the following:

1. Several samples were selected for each type and the leaf epidermis was stripping off by hand and the peeling method was used by utilized an autopsy code and forceps.
2. Took samples from the stem and petiole then made manual clips by the anatomy blade until the very thin sections were obtained. The prepared section transferred into a clean glass petri dish containing sodium hypochloride concentration of 0.5% for five minutes to remove remaining materials and tissue residue lingering on the skin and removing the

chlorophyll dye of the cells to become translucent white sections for the purpose of study of the normal epidermal cells in the epidermis. As well as the study of the components of each tissue of the stem and petiole tissues in a clear and accurate way.

3. The samples were transported to another glass dish containing the safranin stain to give color to the skin for easy imaging and study under the light microscope.
4. Then put the skimmed epidermis and the sections obtained on a clean slide and put on it a drop of glycerin then carefully separated and covered with the cover slide to avoid tissue bubbles in tissues and are ready for microscopic examination and study.
5. The samples were examined by the compound light microscope of the type Olympus and the measurements were taken by using ocular micrometer and the sections were photographed under the camera installed on microscope type Omax. Method of work completed as mentioned [23].
6. The vertical sections of the species leaves have been studied by relying on the fresh samples which collected perversely and the above sections have been prepared according to method [21].
7. The green leaves were drying to identify the system of venation and used method [24].
8. The stomata and epidermis cells were studied.
9. The hairs and their forms are studied within the species.

The study also relied on the terminology contained in [26, 27, 28 and 29].

RESULTS AND DISCUSSION

Characteristics of the transverse section of the stem

The transverse section of the stem of the study plant has been examined and the shape of the stem has appeared quadrate and this is consistent with (2) and by tracking its tissues from out to inward appeared as follows (plate 1):

Epidermis: The cells of the epidermis were prolonged, interspersed with the anomcytic-type complex, and the aglandular hairs appeared to have a prolonged oval with the square base and the sharp end of unicellular. Under the epidermis of the essential tissue which consist of parenchyma cell polygonal shape with (11-12) row. These parenchyma cells represented by the cortex and finished with one layer of polygonal parenchyma cells that are

presented the endodermis then the vascular cylinder began to one layer pericycle of slightly prolonged cells then the tissues of the phloem appeared as a whole cylinder with a range of rows (4-5) row consisting of sieve tubes, companion parenchyma and a few fibres followed by a full ring of the vascular cambium also as a whole ring and then the xylem tissue as full-ring represented the vessels and

appeared as rows. Each row contained (8-9) unit separated by a parenchyma ray in a row or two straight rows. The tracheids interred between the vessels and the xylem tissue finished by the residue of the medullary cells, which are the polygonal parenchyma cells where the stem appeared hollow stem.

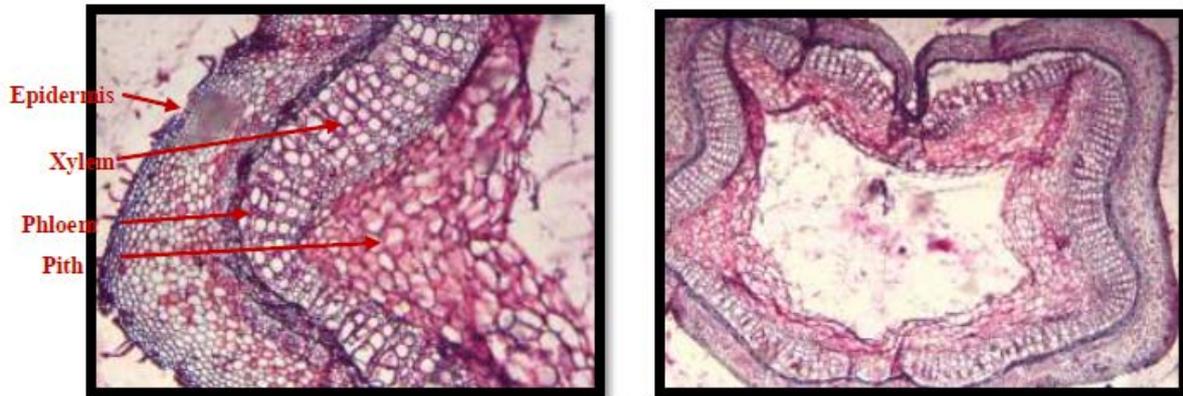


Plate (1): The characteristics of the transverse section of stem in species under study.

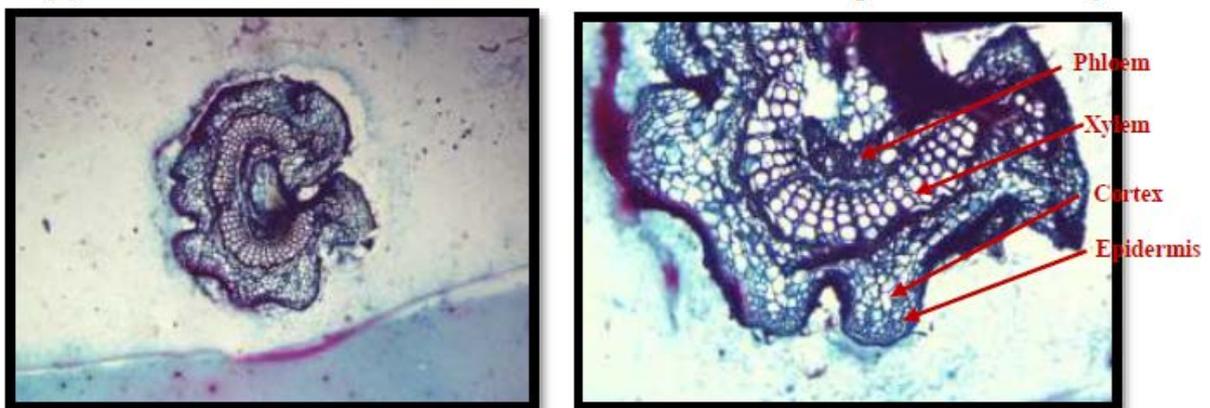


Plate (2): The characteristics of the transverse section of petioles in species under study.

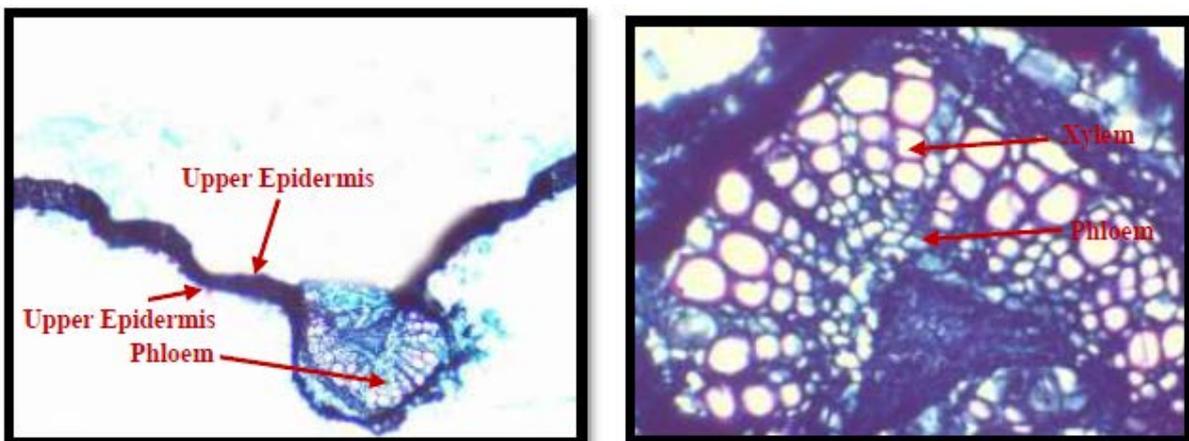


Plate (3): The characteristics of the vertical section of leaf (midrib) in species under study.

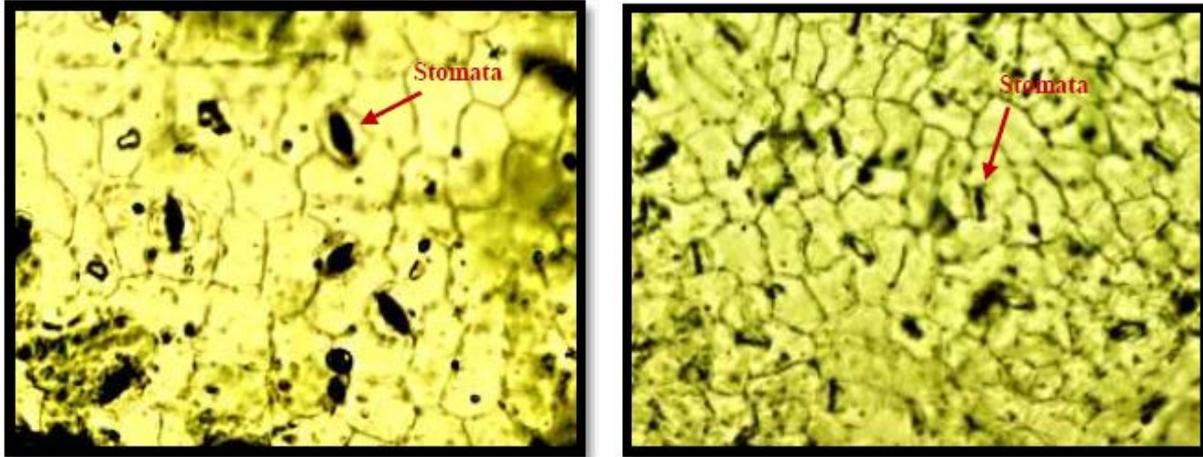


Plate (4): The characteristics of the vertical section of leaf (a-lower epidermis, b- upper epidermis) in species under study.

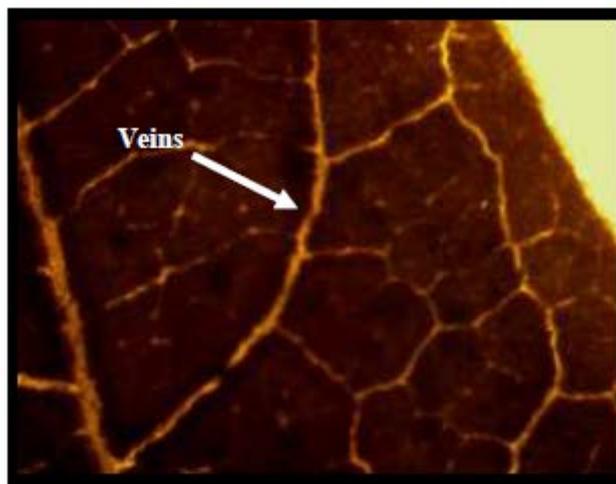


Plate (5): The characteristics of the venation system in species under study.

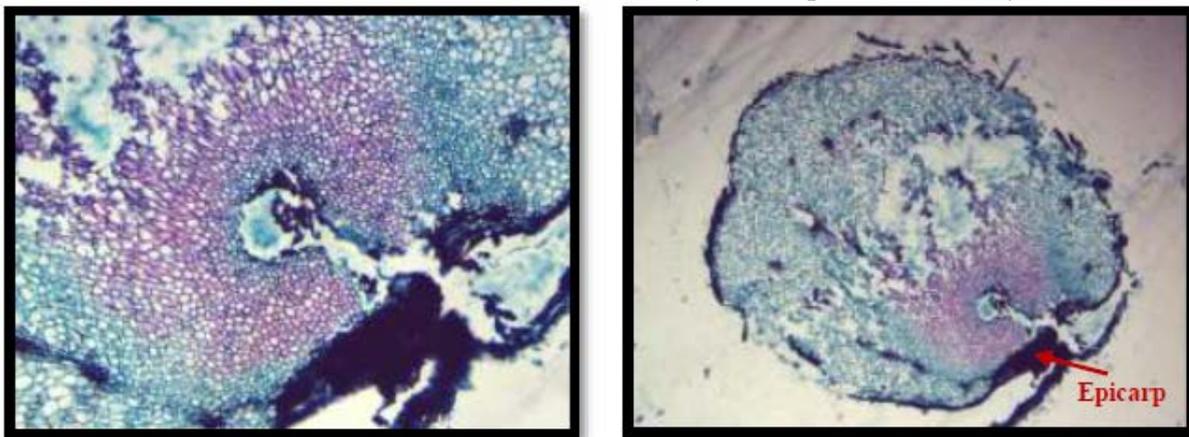


Plate (6): The characteristics of the vertical section of seed in species under study.

Characteristics of transverse sections of petiole

The epidermis cells in the petiole have been shown on a prolonged form, the hairs agranular type, the essential tissue formed by the polygonal parenchyma cells with a number of rows (5-6) and then the vascular cambium cells of a single row. The phloem tissue showed from 2-3 rows of sieve tube and companion cells then xylem tissue

contain from vessels (4-5) units in a row separated by the rays of the phloem parenchyma are straight from a single row of cells and ended with the medullary cavity (plate 2).

The vertical section of leaf blade

The epidermis in the leaf blade recognized into the upper epidermis and lower epidermis, but they were almost the same, where they were of simple epidermis and uniseriate,

which consists of one row of cells with square shapes to obligated and stacked together, and the walls of epidermis cells appear in the surface view undulate (plate 3).

- Stomatal complexities: the stomata of the upper and lower surfaces of the plant leaf under study is called amphistomatic mean that presence of the stomata on both surfaces of the leaf. The spread of the thickness on both surfaces varied and had the highest density on the lower surface of it on the upper surface. The stomata of the anomocytic type, which is the irregular type, was the anomotetracytic on the lower surface, which surrounds the stomata by four assistance cell while a anomotricytic type appears on the upper surface three equal assistance cells which surrounds the stomata. The study showed that vascular tissue in the leaf blade is only an extension of the vascular strip from the stem into the leaf petiole and then to the blade, so the vascular tissue preserved its components of xylem and phloem. The vascular tissue in the blade of the leaf was shown as veins, made up of vascular bundle branching into several interlocking branches are thus connected to and from all parts of the blade and also help to strengthen the blade. The main vascular bundle (central) the largest bundle in the midrib appeared as broad ovate, while the central midrib is made up of (3-4) vessels interspersed with the parenchyma rays of xylem and tracheids and area of xylem above phloem that is show inverted triangle (plate 4).

- The venation system

The blade showed many veins, which is a vascular bundle distributed through the blade that is branching out of the petiole leaf or from its midrib. The study indicated that venation of the brochidodromous type, in which secondary veins do not end at the edge of the leaf and each secondary vein is connected with the upper vein and is associated with a series of prominent arches (plate 5).

Anatomy of seed

The mature seed of studied plant is a spherical-oval and has a dark or black brown and the mature consisted of (plate 6):

Seed coat or testa

Consisting of cells in mostly five or six-sided inner-tangential walls thick lignified shows reticulate thickening and with respect to lateral walls it is thick secondary walls and Lignified.

Lipid layer

Consisting of a row of large polygonal parenchyma, a reservoir of abundance of droplets (oil droplets or drops) and a few granules of starch as well as containing clear nuclei and gaps.

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