

Morphological and Anatomical Study of the Leaves of *Laurus nobilis* L. (Lauraceae), Growing in the Introduction of the Northern Caucasus Region (Russia)

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ABSTRACT

In this article results of morphological and anatomical research *Laurus nobilis* L. are resulted. These plants are growing in the conditions of culture in the Botanical garden of Pyatigorsk medical and pharmaceutical institute (Northern Caucasus region). **Introduction:** *Laurus nobilis* L. is grown up as a decorative species in Europe, RUSSIA, the USA and other countries. Chemical composition of the leaves is characterized by essential oil components, sesquiterpene lactones, phenolic and other compounds. **Material and Methods:** Micro morphological research of vegetative bodies was carried out with the help of a well-known technique. We carry out morphological and anatomical research of a leaf blade and a petiole of a leaf of a plant, which is grown up in a Botanical garden in the Pyatigorsk medical and pharmaceutical institute. **Results:** The diagnostic characteristics of a leaf blade necessary for an establishment of authenticity of raw materials are revealed. The leaf is hypostomal, dorsoventral, stomatal apparatus of paracytic type. The idioblasts with the essential oil are obtained between mesophyll cells. Idioblasts thin-walled, large enough. In the field of the main vein under an epidermis the collenchyma of lamellar type in 4-7 layers settles down. The leaf petiole on cross-section section has the saddle-like form, without a ledge on the abaxial side of leaf. Under an epidermis the parenchyma settles down, is presented by live cells of the roundish or oval form. Between parenchyma cells it is possible to observe numerous cells-idioblasts with contents of yellow colour. **Conclusion:** As diagnostic signs of leaf (a leaf blade and a petiole) it is possible to consider numerous cells - idioblasts with an essential oil, the leaf is *hypostomatal*, dorsoventral, stomatal apparatus of paracytic type. The idioblasts with the essential oil are obtained between mesophyll cells.

Key words: *Laurus Nobilis*, Morphological and Anatomical Study, Anatomical Structure of Leaf, Essential Oil.

INTRODUCTION

Laurus nobilis L. – evergreen *gonochoristic*, seldom monocious plant in height to 15 m. Natural habitats of this plant are territories of the countries of the Mediterranean with high annual level of deposits.¹ It is grown up as a decorative species in Europe, RUSSIA, the USA and other countries. It is cultivated in Turkey, Algeria, Morocco, Portugal, Spain, Italy, France, RUSSIA and Mexico. Chemical composition of the leaves is characterized by essential oil components, sesquiterpene lactones, phenolic and other compounds.^{2,3}

MATERIAL AND METHODS

In carrying out morphological studies revealed as morphological characteristics. Micro morphological research of vegetative bodies was carried out with the help of a well-known technique. We carry out morphological and anatomical research of a leaf blade and a petiole of a leaf of a plant, which is grown up in a Botanical garden in the Pyatigorsk medical and phar-

maceutical institute. The plant material was fixed in the system: ethyl alcohol 96% – glycerol – water in a ratio of 1:1:1. Cross sections of the petiole, the leaf blade was carried out using the blade, staining was performed following histochemical reagents - phloroglucinol and solution of sulfuric acid 50% for the detection of localization of the lignified elements, cerasine red for the detection of essential oil localization. These mounts are examined using BIOMED-2 microscope with Digital Camera Electronic Eyepiece MD300 (3.1 megapixels).

RESULTS

Leaf blade has a dorsoventral type. The covering tissue is represented by the epidermis, the cells of which are covered externally with a thickened cuticle layer. Under the covering tissue is located palisade mesophyll in one layer, between cells of which there are separately lying cells - idioblasts, in

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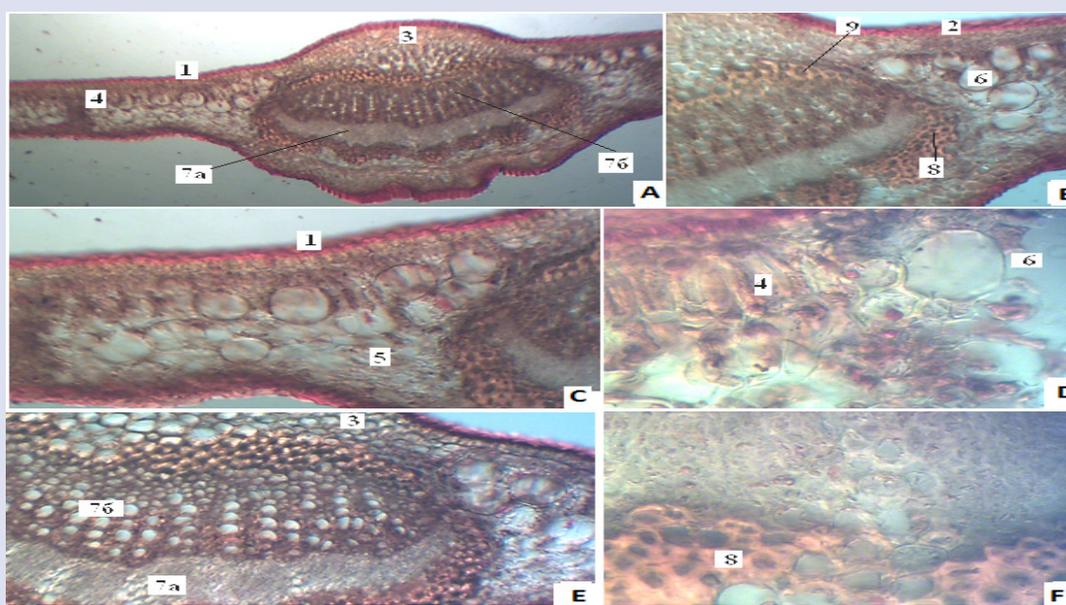


Figure 1: A Cross-section cut of leaf blade *Laurus nobilis* L. (A - general view, B-F - fragments of a cross-section cut of a leaf blade in the field of the main vein) 1 - epidermis, 2 - cuticle, 3 - collenchyma, 4 - palisade mesophyll, 5 - spongy mesophyll, 6 - idioblasts with an essential oil, 7 - the vascular bundle, 7a - phloem, 7b - xylem, 8 - sclerenchyma, 9 - lignified parenchyma.

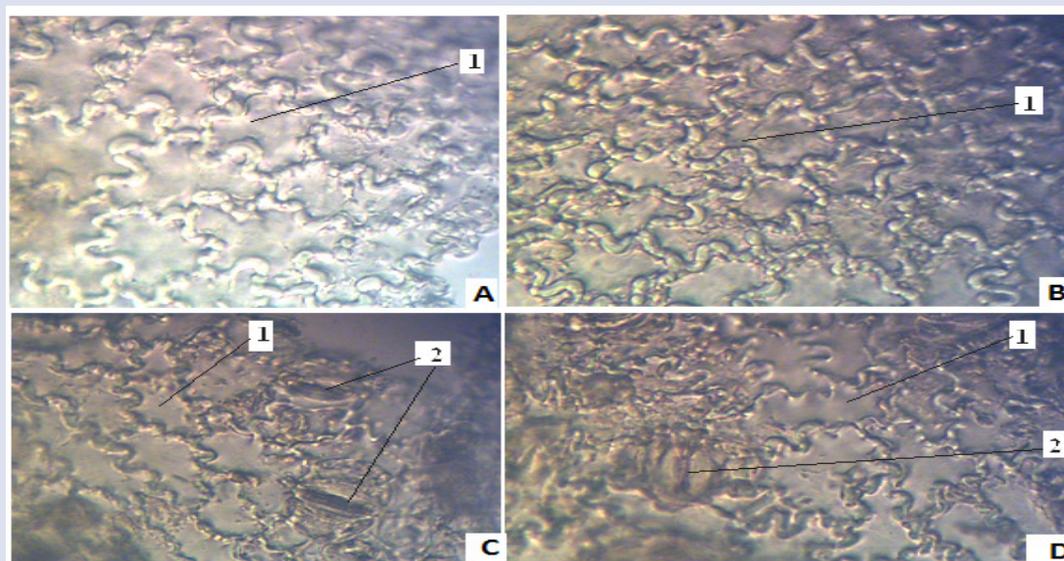


Figure 2: Epidermis of a leaf blade (A, B - upper, C, D - lower) 1 - basic cells of epidermis, 2 - stomatal apparatus (magnification $\times 400$).

which the essential oil accumulate. Idioblasts thin-walled, large enough. The spongy mesophyll is presented freely located near parenchyme cells among which also there are idioblasts. In the field of the main vein under an epidermis the collenchyma of lamellar type in 4-7 layers settles down.

The conductive system of a leaf blade has the vascular structure, the vascular bundles of collateral type of the semi-lunar extended form, the phloem is focused to the abaxial side of a leaf blade. The xylem is presented by large vessels of various diameter, focused to the adaxial side.

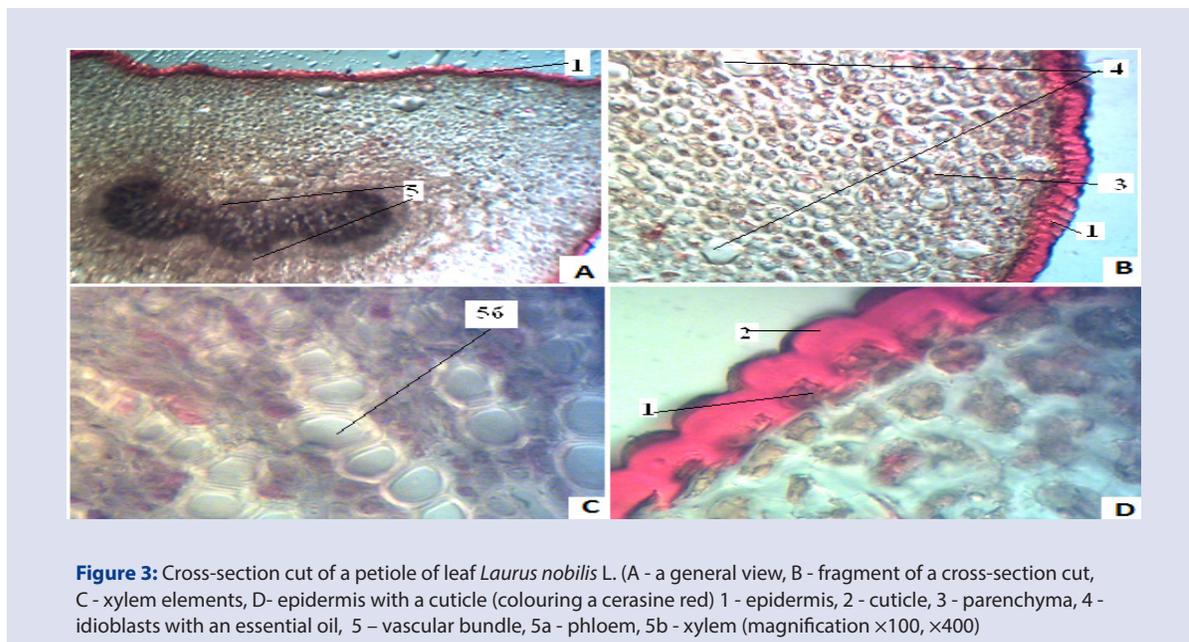


Figure 3: Cross-section cut of a petiole of leaf *Laurus nobilis* L. (A - a general view, B - fragment of a cross-section cut, C - xylem elements, D - epidermis with a cuticle (colouring a cerasine red) 1 - epidermis, 2 - cuticle, 3 - parenchyma, 4 - idioblasts with an essential oil, 5 - vascular bundle, 5a - phloem, 5b - xylem (magnification $\times 100$, $\times 400$)

The sclerenchyma borders on to a phloem and is presented by large fibers with the maximum degree of a lignification. The lignified parenchyma borders of the vascular bundles from outside xylems.

Leaf blade of *hypostomatic* type. The lower epidermis of a leaf blade is presented by cells of the oval form with twisting uniformly beaded anticlinal walls. Stomatal apparatuses of paracytic type that is a characteristic diagnostic sign of family Lauraceae.⁴⁻⁶ The epidermal cells in number of two are located to in parallel closing cells of a stomatal apparatus. Stomata are located often sufficiently. The *trichomes* are absent. The upper epidermis is presented by cells with twisting anticlinal walls. Stomatal apparatus and *trichomes* are absent.

The leaf petiole on cross-section section has the saddle-like form, without a ledge on the abaxial side of leaf. The cover tissue is presented by an epidermis which cells are covered by a thick layer of a cuticle. At histochemical reaction by a cerasine red occurrence of orange colouring of a cuticle is observed.

Under an epidermis the parenchyma settles down, is presented by live cells of the roundish or oval form. Between parenchyma cells it is possible to observe numerous cells-idioblasts with contents of yellow colour. The conductive system is presented by three connivent conductive fascicles of collateral type which form continuous structure. The phloem is oriented to the lower side, presented by small sieve elements. The xylem consists of vessels of various diameter and parenchymic elements with the minimum degree of a lignification.

DISCUSSION

The morphological and anatomical characteristics of leaf *Laurus nobilis* L. were examined in this study. These plants are growing in the conditions of culture in the Botanical garden of Pyatigorsk medical and pharmaceutical institute (Northern Caucasus region). The diagnostic characteristics of a leaf blade necessary for an establishment of authenticity of raw materials are revealed. The leaf is hypostomal, dorsoventral, stomatal apparatus of paracytic type. The idioblasts with the essential oil are obtained between mesophyll cells.

CONCLUSION

As diagnostic signs of leaf (a leaf blade and a petiole) it is possible to consider numerous cells - idioblasts with an essential oil, the leaf is *hypostomatical*, dorsoventral, stomatal apparatus of paracytic type. The idioblasts with the essential oil are obtained between mesophyll cells.

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CONFLICT OF INTEREST

When performing this research conflicts of interest did not arise, since all of the authors have conducted research work comprehensively.

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