



**MORPHOLOGICAL AND ANATOMICAL STUDY OF  
BLACK CURRANT (*RIBES NIGRUM* L.) LEAVES GROWING  
IN UZBEKISTAN**

**M.T. Mullajonova**

**R.M.Ramanova**

<https://doi.org/10.5281/zenodo.18465607>

**ARTICLE INFO**

Received: 22<sup>nd</sup> January 2026

Accepted: 30<sup>th</sup> January 2026

Online: 31<sup>st</sup> January 2026

**KEYWORDS**

*Blackcurrant leaves, whole raw materials, microscopic analysis, Motic B1-220A-3, trichomes, corymbose, adaxial, abaxial, hypostomatic, anomocytic, hemiparacytic.*

**ABSTRACT**

*The morphological and anatomical characteristics of blackcurrant leaves growing in Uzbekistan were studied. The results will enable the identification of this raw material, support the development of regulatory documents, and facilitate its introduction into medical practice as a new diuretic drug.*

Blackcurrant is one of the most valuable berry crops. Its widespread use is due to its high winter hardiness, undemanding growing conditions, and high productivity, as well as the significant nutritional and medicinal value of its berries [1]. The chemical composition of blackcurrant berries, leaves, and buds represents a natural, complex source of vitamins. Blackcurrant *leaves* contain a complex of biologically active substances, including vitamin C, flavonoids, and essential oils, which determines their high biological value. They are used in medicine as an anti-inflammatory and restorative, and in the food industry as a flavoring additive in canning and herbal tea production [2].

The results of preliminary pharmacological studies indicate pronounced diuretic activity. This, along with the widespread distribution of blackcurrant in Uzbekistan, confirms the relevance and feasibility of further study of its leaves for their introduction into medical practice and the development of effective import-substituting diuretic medicinal preparations based on them.

To introduce new medicinal products into medical practice, research is necessary to develop indicators of authenticity and quality. In accordance with the guidelines of the State Pharmacopoeia of the Russian Federation, 14th edition, authenticity was ascertained based on a study of the external and anatomical diagnostic characteristics of blackcurrant leaves, which are necessary for the preparation of regulatory documentation.

The objective of this study was to investigate the external and anatomical diagnostic features of blackcurrant leaves growing in Uzbekistan.

The study focused on analytical samples of blackcurrant leaves. First, the external characteristics of the blackcurrant leaves were analyzed. The leaves were laid out on



glossy paper (40x50 cm) and carefully examined from all sides visually and under a 10x magnifying glass. The dry leaves were examined for pubescence (under a magnifying glass and stereomicroscope), color (of the leaves), odor, and taste. Morphological characteristics of the leaves were determined after they had been soaked. For this purpose, the blackcurrant leaves were immersed in hot water (5-10 minutes) and then laid out on a glass plate for examination. Morphological characteristics of the leaves were examined, including the shape and size of the leaf blade, the nature of the margin, the structure of the apex and base, and the type of venation.

*Whole raw material.* Pieces of *blackcurrant leaves* with serrated edges, three to five lobes with golden glands along the veins. The lobes are usually broadly triangular, the middle lobes are often elongated, dull, dark green, and glabrous above, and fuzzy along the veins below.

The above morphological characteristics of the raw materials fully correspond to their description in the State Pharmacopoeia of the Russian Federation, XIV edition, other regulatory documents and literary sources.

*Microscopic analysis.* Analysis of microscopic features of raw materials was carried out according to the methods of the State Pharmacopoeia of the Russian Federation, XIV edition (BPA.1.5.3.0003.15 "Technique of microscopic and microchemical study of medicinal plant materials and medicinal herbal preparations", BPA.1.5.1.0002.15 "Herbs" [3, 4, 5]). The preparations prepared manually were stained with methylene blue and then sealed in glycerin. The finished temporary preparations were examined under a "Motic B1-220A-3" microscope with a 7x, 10x eyepiece, 4x, 8x, 20x, 40x objectives (at a magnification of x28; x40; x56; x80; x140; x200; x280; x400). The objects were captured with a Canon A123 digital camera. The images were processed on a computer using "Photoshop CS5".

*When examining the collection under a stereomicroscope (4x, 8x, 10x, 20x, 40x), the following are visible:* epidermal cells with highly convoluted and convoluted walls are visible on the upper leaf surface, while on the underside, they have slightly convoluted and convoluted walls. On the upper leaf surface, trichomes are sparsely distributed throughout the blade; on the underside, they are found along the veins, close to the margin, and along the margin, they are covered with simple, pointed, conical, unicellular trichomes with a long, warty cuticle. Numerous corymbose glands are visible on the adaxial and abaxial sides of the leaf epidermal cells. Pigment cells are found among the epidermal cells, and secretory ducts are visible along the vein. The leaf parenchyma contains idioblasts containing calcium oxalate druses. The leaves are hypostomatic, anomocytic and hemiparacytic, with stomata located on the abaxial (underside) side of the leaf.

The vascular bundle includes the reticular, scalene vessels and spiral tracheids (Fig.).

Thus, the conducted research ascertained morphological and anatomical diagnostic features that enable the identification of the authenticity of blackcurrant leaves. The obtained results provide a scientifically sound basis for reliably determining the authenticity of the medicinal plant material under study and serve as the basis for the

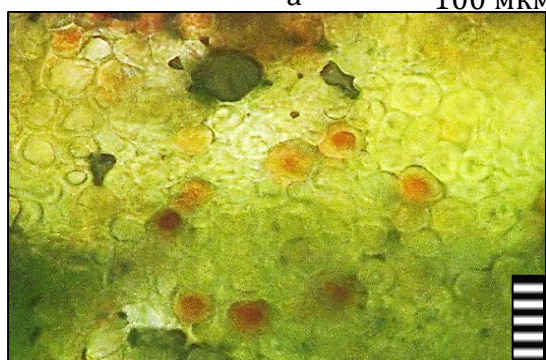
development of regulatory documentation and its subsequent introduction into medical practice as a new medicinal product.



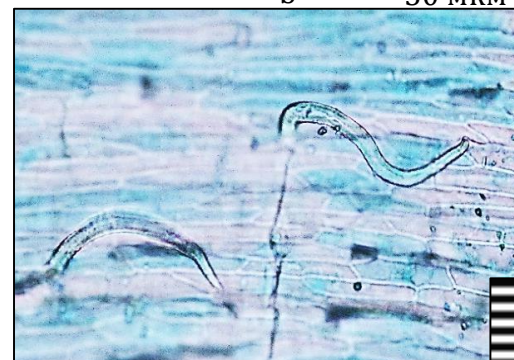
a 100 μm



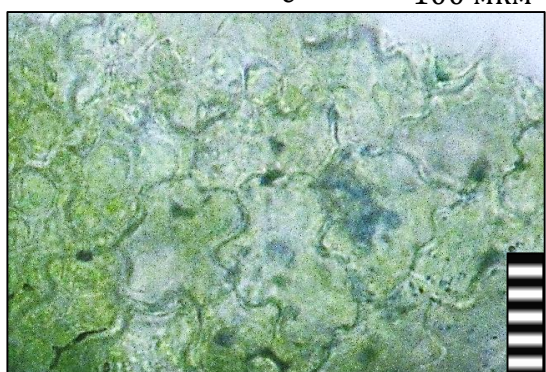
b 50 μm



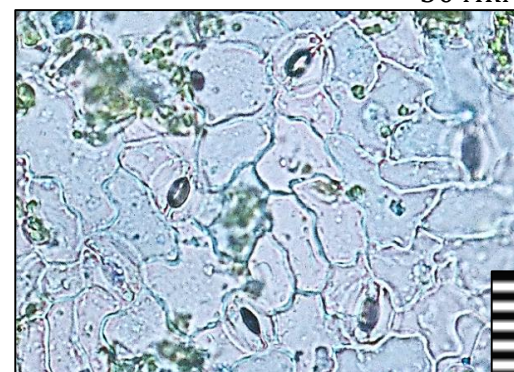
c 100 μm



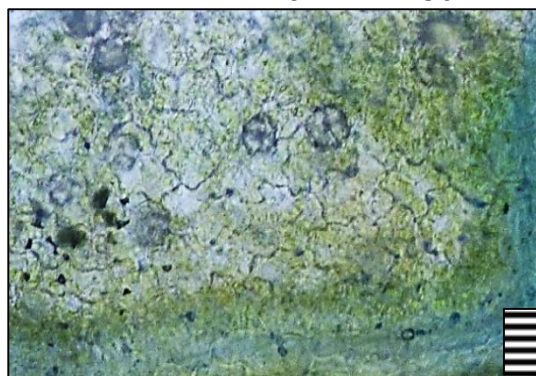
d 50 μm



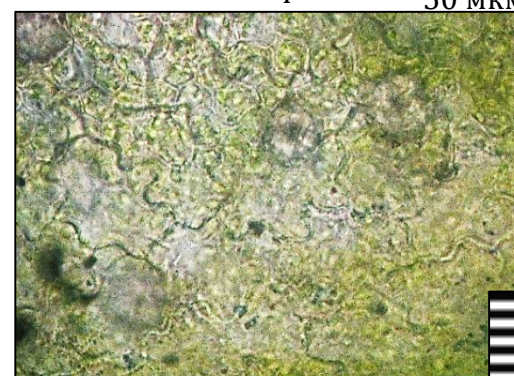
e 50 μm



f 50 μm



g 50 μm



h 50 μm



**Figure. Anatomical structure of a *Ribes nigrum* leaf:**

**a** – venation of the leaf blade of the epidermal cell, **b** - reticular and scalene vessels and spiral tracheids in vascular bundles, **c** - secretory passages, **d** – simple hairs along the veins on the abaxial (lower) side of the epidermal cells of the leaf,

**e** – adaxial epidermis, **f** – abaxial epidermis, **g** – calcium oxalate druses on the adaxial side of epidermal cells.

**Conclusions:** 1. The morphological and anatomical diagnostic features of black currant leaves growing in Uzbekistan, necessary for the identification of raw materials, were studied.

2. The obtained data will be used in the development of draft regulatory documentation for this raw material.

**References:**

1. Identifier of currant varieties: reference book / T.P. Ogoltsova [et al.]. - Orel: VEIISPK Publishing House, 2000. - 292 p.
2. Mullajonova M.T., Urmanova F.F., Pulatova D.K., Duschanova G.M. Morphological and anatomical study of the new plant collection PHYTOFRUFOL *Cardiometry* 21.04.2022; Accepted: 5.05.2022; Published online: 25.05.2022 p.173-176 <https://cardiometry.net/issues/no22-may-2022/morphological-anatomical-study>
3. State Pharmacopoeia of the Republic of Uzbekistan. First edition, volume 1. - Tashkent. 2021. - p. 409.
4. State Pharmacopoeia of the Russian Federation. - Pub. XIV.-M.: Medicine. 2018.-Vol. P. 2327.
5. BPA.1.5.1.0002.15 "Herbs" State Pharmacopoeia of the Russian Federation. Moscow, 2015. Vol. 2. 13th edition. Access mode: [http://193.232.7.120/feml/clinical\\_ref/pharmacopoeia\\_2/HTML/#272](http://193.232.7.120/feml/clinical_ref/pharmacopoeia_2/HTML/#272)