The determination of diagnostic characters of Aerva Lana (L.) JUSS.

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Abstract. In this article, there are the findings of scientific research on diagnostic characters belonging to the vegetative organs of Aerva lanata (L.) Juss. aimed at ascertaining the identity and authenticity of raw material. The authors found the following diagnostic characters: leaf indumentum made of conic polygonal hairs; dorsoventral mesophyll with two rows of narrow long palisade cells; the midrib projecting on the underside of leaf with angular collenchyme sections on both sides. Besides, the authors found large groups of pericyclic fibers, resin ducts in the radial rays of phloem and medulla siding with perimedular zone. There are gydrocytic cells in medulla.
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Introduction

Medicinal plants have always been and remain an important source of human life and health. That is why the need for them in health care grows year after year [1; 2].

As a result of the excessive demand for medicinal plants, their harvesting increased in the natural habitats that already cannot supply this increasing demand. Many medicinal plants have a low regenerative capacity. Their aerial parts recover during 3-8 years on average. There are several advantages of using cultivated plants as compared with picking wild raw material. This is because the risk of depletion of natural resources reduces, and more homogeneous and high-quality batches of raw material come for processing. The investigation and rational use of cultivated medicinal plants is connected with the development of pharmaceutical and medical industry.

Aerva lanata (L.) Juss is one of the medicinal plants that are not well studied and not popular in folk and scientific medicine. It is distributed in the flora of Southeast Asia, in Saudi Arabia, tropical and Southern Africa and India [3; 4].

The wild specimens of this plant are not found in Kazakhstan, but people cultivate it. The analysis of publications about medicinal plant showed that *Aerva lanata (L.) Juss* **is used in medicine as a diuretic and anti-inflammatory agent** [5; 6].

It increases the elimination of Na+, Ca2+ and less K+. It lowers the content of urea in blood serum. Besides, it is a strong diuretic agent and promotes the dissolving of nephroliths. It reduces inflammation in urinary tracts, urinary bladder, appendages, renal pelvis and prostate. *Aerva lanata* favours the resolution of metrofibroma; lowers blood sugar; helps in the treatment of hepatocirrhosis and pancreas; reduces coagulation and thereby prevents from thrombi formation in vessels.

As publications show, the diagnostic characters of leafs and flower-bearing stems of Aerva Lanata are not well studied. That is why the investigation of these diagnostic characters is necessary for obtaining herbal medicines and drug formulations [7-10].

The purpose of this study is to study the diagnostic characters of leafs and flower-bearing stems of Aerva lanata (L.) Juss. for ascertaining the identity and authenticity of raw material**.**

Materials and methods.

The grinded air-dry leafs and flower-bearing stems of Aerva lanata (L.) Juss. procured in Southern Kazakhstan are the object of this research. The microscopic investigations were conducted using temporary slide mounts by a conventional method of M.N. Prozina (1960) [11]. Sections were put in glycerin, studied and drawn with the help of light microscope MBI-3 (magnification x84 and x21) and drawing instrument RA-6.

The leafs are small, 2 cm long and 1 cm wide, smooth-edged, mucronate-oval. The base is tapered, the top is mucronated. The leaf plate is thin. The side veins reach the edge of the leaf plate. The leafstalk is low-ribbed.

The leaf anatomy is shown in Figure 1 (A-D). The top epidermis of the leaf has a single row and consists of many and cells that are isodiametric or stretched along the leaf axis (Figure 1 C). Cell walls

are rectilineal, slightly anfractuose. The outer walls are thickened. The indumentum consists of simple conic multicellular hairs. The stomata are rare, anomocytic and hemiparacytic, oval, disorderly-oriented and unsubmerged. The lower epidermis consists of relatively small cells that are isodiametric or stretched longitudinally, but cell walls are more anfractuose. The stomata are numerous, anomocytic, polocytic, hemiparacytic and unsubmerged. By veins, the epidermal cells are tetrahedral and stretched along the axis (Figure 1 D). The mesophyll is dorsoventral. Under the top epidermis, there are two rows of narrow palisade cells ending above the bundles. The spongy parenchyma consists of 4-5 rows. It contains chlorophyll and ends above the bundles (Figure 1 A). The conducting bundles consist of small vessels and phloem. They are not sclerosed, but are surrounded by a water-bearing sheath. Any inclusions were not detected. The midrib makes a small projection on the upper side of the leaf and a big one on the lower side. These projections consist of several rows of angular collenchyme. The vessels are very small. They form 8-10 radial chains (Figure 1). The flower-bearing stem is soft, herbaceous, low-ribbed and covered by a single-row thick-walled and small-celled epidermis (Figure 2 A-C). Four-five rows of cells under the epidermis are rounded, collenchymal and with thick walls. Lower 6-8 rows are thin-walled and tangentially prolonged. In the cortex, there are 10-13 rows of parenchyma in all. Pericyclic fibers form large groups, here and there joined. Wood thickness is less than cortex thickness. The vessels of primary xylem are small; the vessels of the secondary one are bigger and placed in radial chains. The libriform and wood parenchyma are not numerous in bundles. Large bundles and small bundles alternate and are divided by two-row and four-row radial rays. Single resin ducts are found in the top part of radial rays. The medulla is vast and consists of small rounded cells. The resin ducts are numerous and surrounded by 6 lining cells in perimedullar zone. Some cells of the medulla are similar to hydrocytic cells with the visible pitting of walls (Figure 2 C).

Results and discussion.

Microscopic examination is the principal method of ascertaining the authenticity of grinded medicinal raw material that can be cut (crushed), powdered, briquetted and granulated (cut and pressed). It is based on the knowledge about plant anatomy. This method consists in searching for typical diagnostic characters in the whole picture of the anatomy of various organs and tissues. The studied object can be distinguished from similar parts of another plant by these diagnostic characters.

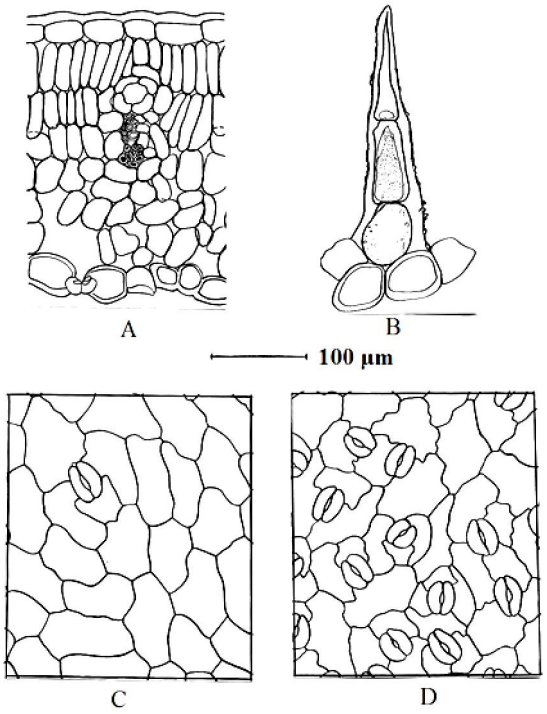

Figure 1. The leaf anatomy of Aerva lanata (L.) Juss.
A: transverse section, palisade
B: trichome
C: upper (adaxial) epidermis
D: lower (abaxial) epidermis

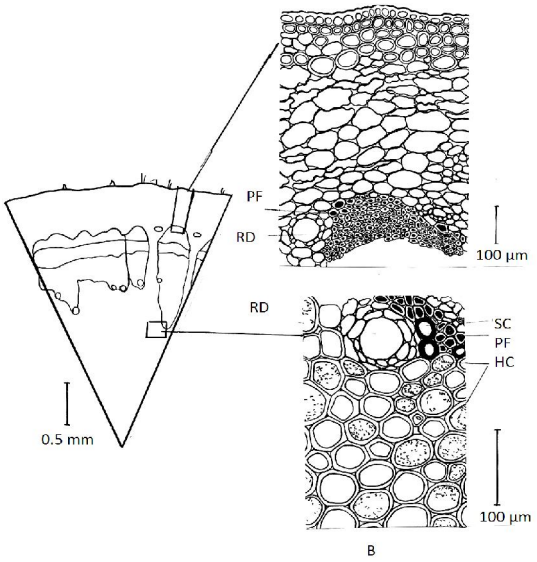

Figure 2: The anatomy of the flower-bearing stem Aerva lanata (L.) Juss.
A: the scheme of transverse section
B: the part of cortex
C: the part of perimedullar zone and medulla
PF: pericyclic fibers
HC: hydrocytic cells
RD: resin ducts
SC: sclerenchyma

As known, some anatomical and morphological characters are phenotypically unsteady. In certain conditions, they can become apparent or not (indumentum, leaf color, thorns presence, the quantity of glandules, etc.) That is why it is important to determine constant characters for official species for accurate diagnostics of raw material [12-21].

In cooperation with the Laboratory of Anatomy, Morphology and Cytoemriology of Plants based on the Institute of Floral and Faunal Gene Pool of The Uzbekistan Academy of Sciences, the authors investigated the structural diagnostic characters of *Aerva lanata.* These investigations are performed for the first time in Kazakhstan.

So, when examining the raw material of *Aerva lanata*, one can use leaf indumentum made of conic polygonal hairs, dorsoventral mesophyll with two rows of narrow long palisade cells, and the midrib projecting on the underside of leaf with angular collenchyme sections on both sides. In the stalk, the authors found large groups of pericyclic fibers, resin ducts in the radial rays of phloem and medulla siding with perimedular zone, and gydrocytic cells in medulla.

Conclusions.

The diagnostic characters of the leafs and flower-bearing stem of Aerva lanata (L.) Juss. were studied in order to ascertain the identity and authentity of raw material.

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References

1. Sinha R.K., 1998. The renaissance of traditional herbal medicine. Ethnobotany, INA Shree publishers, pp: 231-232.
2. Kolammal M., 1963. Pharmacognosy of Ayurvedic drugs. pp: 6.
3. Dulaly C., 2002. Antimicrobial activity and cytotoxicity of Aerva lanata. Fitoterapia, 73: 92-94.
4. Udupihille M. and M.T. Jiffry, 1986. Diuretic effect of Aerva lanata with water, normal saline and coriander as controls. Indian J Physiol and Pharmacol, 30: 91-97.
5. Rao S.G., 1985. Evaluation of an experimental model for studying urolithiasis effect of Aerva lanata on urinary stones. Indian Drugs, 22: 640-643.
6. Vetrichelvan T., 2000. Diuretic and anti-inflammatory activities of Aerva lanata in rats, 62: 300-302.
7. Zapesochnaya G., 1992. Canthin-6-one and beta-carboline alkaloids from Aerva lanata. Planta Medica, 58: 192-196.
8. Kokate C.K., 1996. Practical Pharmacognosy. Vallabh Prakashan, Delhi., pp: 107-111.
9. Mallabev A, A. Rakhimov and Y.M. Murdakhaev, 1989. Carbohydrates of Aerva lanata, Chem Nat Comp, 25(3): 369-370.
10. Majmudar F.I., M.B. Shah, K.N. Patel and B.K. Shah, 1999. Aerva lanata- its diuretic and hepato-protective activity, Indian J Nat Prod, 15(1): 9-12.
11. Prozina, M.N., 1960. Botanic Microtechnique. Moscow: “Vysshaya Shkola”, pp: 206.
12. Butnik, A.A., O.A. Ashurmetov, S.A. Payziyeva and R.N. Nigmanova, 2002. Ecological Anatomy of Desert Plants in Central Asia. Tashkent: “Fan”, pp: 128.
13. Aydosova, S.S. and N.M. Mukhitdinov, 2002. The First Results and Prospect of Anatomical Research of Botany Department. The Results and Prospect of Botany in Kazakhstan. International Scientific Conference. Almaty, pp: 11-1
14. Mamykova, R.U., 2012. The Introduction of Medicinal Plants in the Foothill Zone of Southern Kazakhstan. Shymkent, pp: 136.
15. Cherepanov, S.K., 1995. Tracheal Plants of Russia and Neighbouring States. Saint-Peresbourg: “Mir I Semya”, pp: 990.
16. Yuldashev, A.S., 2001. Medicinal Plants of Southern Turkestansky and Nothern Zaravshansky Ranges. PhD thesis. Tashkent, pp: 49.
17. Khokhryakov, A.P., 1994. Biologic Morphology of Plant Reproductive Organs. The Success of Ecologic Morphology of Plants and its Influence on Allied Sciences. The Collection of Research Papers. Moscow: “Prometey”, pp: 44-45.
18. Xi-Wen L., I.C. Hedge and L. Salvia, 1994. Flora of China. Beijing: Science Press, 17: 195-222.
19. Nikolayeva, M.G., 1996. The Peculiarities of Seed Growing Depending on Phylogenetic Position and Ecogeographical Conditions. 46 (3): 432-437.
20. Mashanov, V.I. and A.A. Pokrovskiy, 1991. Spice and Aromatic Plants. Moscow: “Agropromizdat”, pp: 287.
21. Metcalte C.R. and L.Chalk, 1950. Anatomy of Diccotiledons. Oxford. 2: 782-804.

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