

Morphological and anatomical study of freshly harvested *Artemisia* raw materials
absinthium L. - Wormwood used in homeopathy

T.L. Kiseleva, L.N. Frolova, Zh.A. Soyunova, E.V. Konovalova, N.N. Melnikova, E.V.
Tsvetaeva

(Institute of Homeopathy and Naturotherapy of the Federal Scientific Clinical and
Experimental Center for Traditional Methods of Diagnostics and Treatment
Roszdrav, Moscow)

SUMMARY

The anatomical structure of freshly harvested raw wormwood (*Artemisia absinthium* L.), used in domestic homeopathic practice, has been studied. Anatomical and diagnostic signs of raw materials (leaves, grass and roots) were found, which can be used as a criterion for assessing its authenticity. The results of the study were used to develop a draft regulatory documentation for freshly harvested raw wormwood.

Key words: bitter wormwood, *Artemisia absinthium* L., anatomical and diagnostic signs of raw materials, morphological signs of raw materials, external signs of raw materials, traditional medicine, official medicine, homeopathy.

RESUME

The anatomic structure of Common Wormwood (*Artemisia absinthium* L.) fresh raw product, which is used in domestic homeopathy practice, has been studied. The raw product anatomo-diagnostic characteristics have been defined (leaves, herb and roots) and could be used as a criteria of its identity assessment.

The study findings have been used for normative documentation draft elaboration for the given raw product.

I. INTRODUCTION

At the Federal Scientific Clinical and Experimental Center for Traditional Methods of Diagnostics and Treatment of the Federal Public Health Service, a planned study of the domestic raw material base for the production of homeopathic medicines is being carried out. In modern homeopathic practice, raw materials and producing plants of the genus *Artemisia*. The genus *Artemisia* includes more 250 plant species [11], of which 4 are used in homeopathic practice: *Artemisia absinthium* L. - bitter wormwood (homeopathic Absinthium); *Artemisia vulgaris* L. - common wormwood or Chernobyl (homeopathic *Artemisia vulgaris* preparation); *Artemisia abrotanum* L. - wormwood god tree (Abrotanum); *Artemisia cina* Berg. ex Poljak - citrine wormwood (preparation Cina). 3 types of wormwood grow on the territory of the Russian Federation; raw material *Artemisia cina* Berg. ex Poljak is imported.

The State Pharmacopoeia of the XI edition contains a pharmacopoeial monograph on dried raw materials (grass collected at the beginning of flowering; leaves collected or at the beginning of flowering) of a wild perennial plant of wormwood, which is used in allopathic practice as a means to stimulate appetite and

choleretic [3]. A galenic preparation made from raw wormwood - wormwood tincture [7, 8, 9, 10] - is approved for medical use in Russia as an appetite stimulant of plant origin [2]. Dried wormwood herb is also official [6]. There are no domestic normative documents for the wormwood tree. There is also no regulatory documentation for freshly harvested raw materials of all 3 types.

In this regard, the development of reliable criteria for assessing the authenticity of freshly harvested raw materials of these types of wormwood, and, in particular, the sections "External signs" and "Microscopy" is urgent. The purpose of this work was the morphological and anatomical study of the raw material of wormwood (*Artemisia absinthium* L.) of the aster family (Asteraceae).

Wormwood is included in the nomenclature of homeopathic medicines in Germany (fresh tops and flowers) [12] and France (fresh aerial part) [13]. In domestic homeopathic practice, fresh basal leaves and flowering tops of wormwood stems are used to prepare a matrix tincture [1]. The main indications for use in clinical homeopathic practice are: hepatitis, cholecystitis, biliary dyskinesia. In terms of action, the drug belongs to antipsoric energetics of general action (weakness) with a predominantly anti-syphilitic energetic effect on the central nervous system (psychosis, epilepsy, convulsions) [5].

Wormwood preparations cause hyperemia of the brain and spinal cord, which intensifies when taken with alcohol [5]. In homeopathic practice, the monocomponent preparation *Absinthium* is used, which is part of the complex homeopathic preparation *Nux vom-plus* (OOO Doctor - N, Russia, Moscow) [4].

In order to develop authenticity characteristics for fresh medicinal plant raw materials (fresh aerial part) *Artemisia absinthium* L., used in homeopathic practice, we studied its macroscopic and anatomical and diagnostic signs.

The underground part of wormwood is not used in homeopathic practice, but it is an unacceptable admixture to rhizomes with roots of wormwood. In connection with the need to identify impurities in raw materials of any kind, including raw materials of the genus *Artemisia*, we also carried out a morphological and anatomical study of the underground organs of wormwood.

II. MATERIALS AND METHODS

The object of this study was fresh grass and roots of wormwood. The raw materials were procured in the Yasnogorsk district of the Tula region. The grass was harvested in July 2004, the roots - in October 2004. Microscopic examination was carried out in accordance with the general article "Technique of microscopic and microchemical examination of medicinal plants" [3].

All parts of the plant intended for microscopic examination were preserved in 90% alcohol immediately after collection. In order to get more

enlightened micropreparation, us was several modified pharmacopoeial technique for the study of the leaf blade. Namely, the boiling time in 5% alkali solution (1: 1) was increased to 5–6 minutes for easier separation of the epidermis from the leaf mesophyll. The study of anatomical diagnostic signs was carried out using an Olympus CX 41 microscope (Japan) with 19x eyepieces and 4x, 10x, 20x, 40x and 100x objectives. For photography, an Olympus Digital Camera C 3000 Zoom (Japan) was used.

III. RESULTS AND DISCUSSION External signs of freshly harvested raw materials

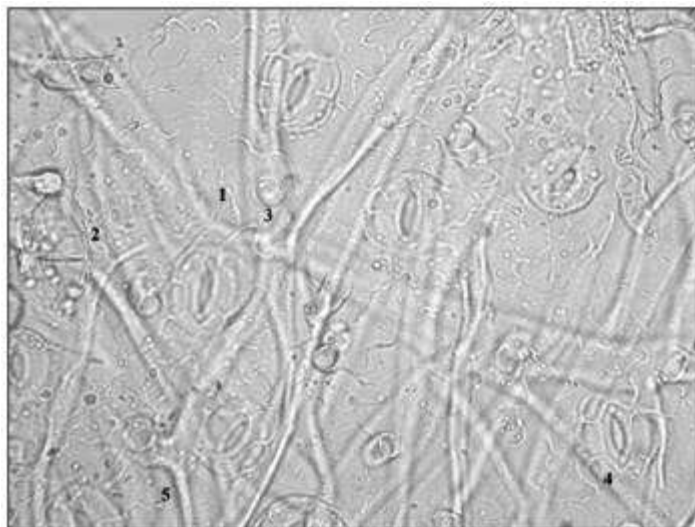
Wormwood herb is a leafy topsflowering stems that do not contain woody parts of the stem. The flowering stems are ribbed, straight, ending in a dense panicle inflorescence.

The inflorescence consists of small spherical baskets 2.5–4 mm in diameter. Baskets drooping, one or two in the axils of the lanceolate covering leaves. Outside, the baskets are covered with a wrapper of oblong-oval leaves, the outer ones are almost the same length as the inner ones, they are concave along the back, broadly filmy along the edge. The receptacle is convex, covered with white ribbon-like scaly films. Flowers are small, outer tubular - pistillate, inner funnel-shaped - bisexual. Stem leaves are petiolate, rounded-triangular, double- or thrice-pinnate; the apical leaves are sessile, whole or tripartite. All parts of the plant are densely pubescent. The color of the stems and leaves is grayish-green, the flowers are yellow. The smell is fragrant. The taste is spicy bitter.

The leaves of wormwood are petiolate, triangular-rounded in outline double- or thrice-pinnately dissected; without petioles, whole or tripartite. Leaf segments are linear-oblong, blunt-pointed. The leaves are pubescent on both sides. The blade is 4–12 cm long, 3–7 cm wide. The color of the leaves is grayish-green. The smell is fragrant. The taste is spicy bitter.

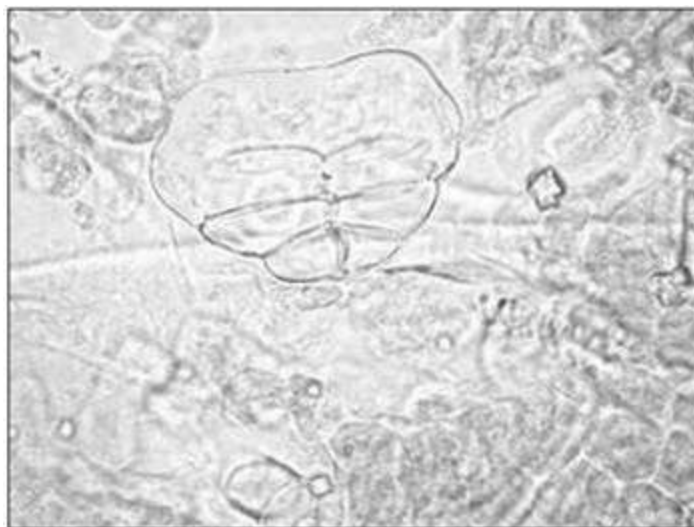
Anatomical and diagnostic signs of the leaf

Top side of the sheet. Epidermal cells are thin, sinuous walls (Fig. 1). The stomata are numerous, anomocytic type, surrounded by 3-5 cells (Fig. 1).



Rice. 1. The area of the upper side of the epidermis of the leaf *Artemisia absinthium* (uv.x40): 1 - cells of the epidermis with winding walls; 2 - oval essential oil gland; 3 - the base of the hair; 4 - stomata; 5 - T-shaped hair.

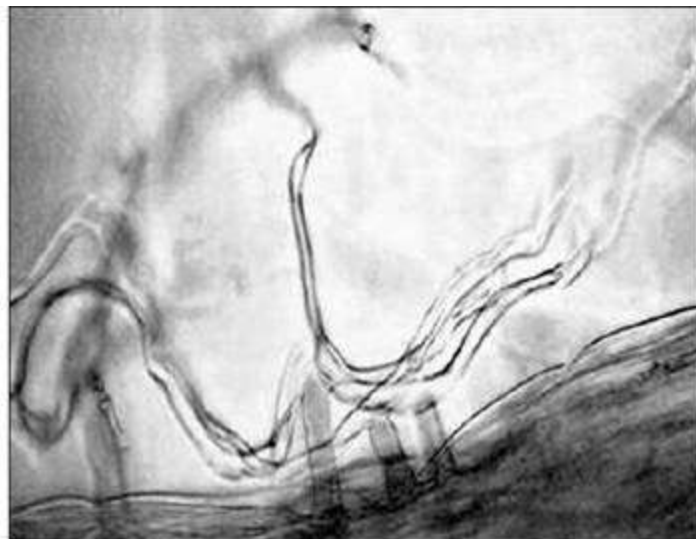
Along the entire surface of the leaf blade, there are T-shaped hairs with a stem of 2-3 cells and bearing a long, thin-walled cell, located horizontally and attached to the stem in the middle (Fig. 4, 5). The places of attachment of hairs to the epidermis are clearly visible, in the form of rounded ridges (Fig. 1, 4). There are numerous large, oval-shaped essential oil glands (Fig. 1-3). When examining them, it is noticeable that they consist of 8, less often 6 cells arranged in 2 rows and 4 tiers on a short unicellular stalk (Fig. 2).



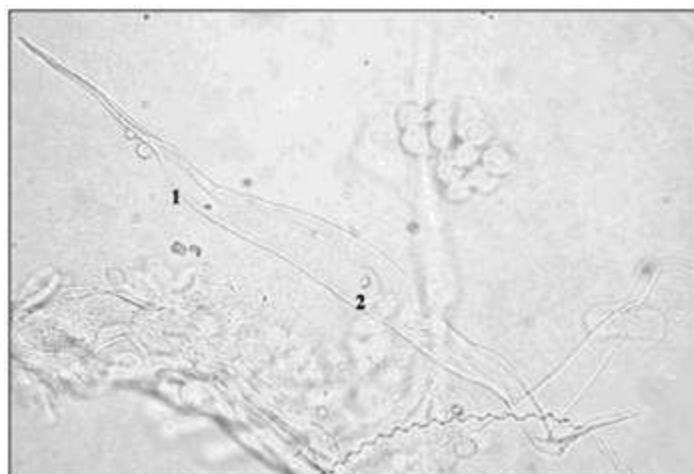
Rice. 2. Essential oil gland in the epidermis of the leaf *Artemisia absinthium*. Side view (sw. x100).



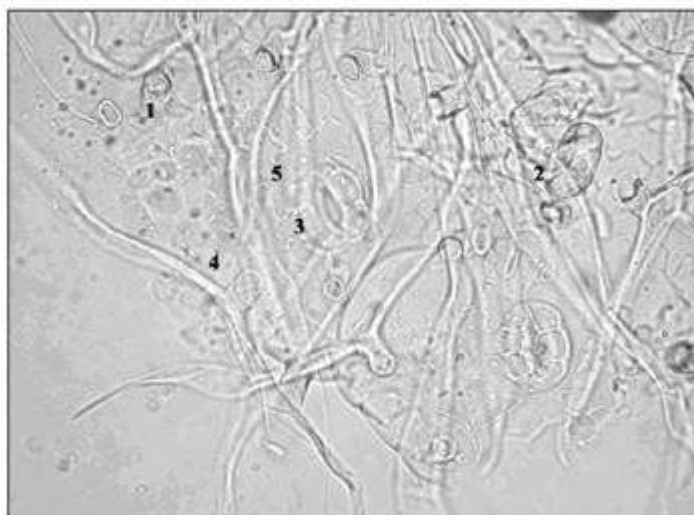
Rice. 3. Essential oil gland in the leaf epidermis *Artemisia absinthium*. View from above (sw. x100).



Rice. 4. T-shaped hairs along the edge of the sheet *Artemisia absinthium* (uv.x40).



Rice. 5. A fragment of a T-shaped hair *Artemisia absinthium*. Top view (sw.x40): 1 - T-shaped hair (top view); 2 - the leg of a T-shaped hair.



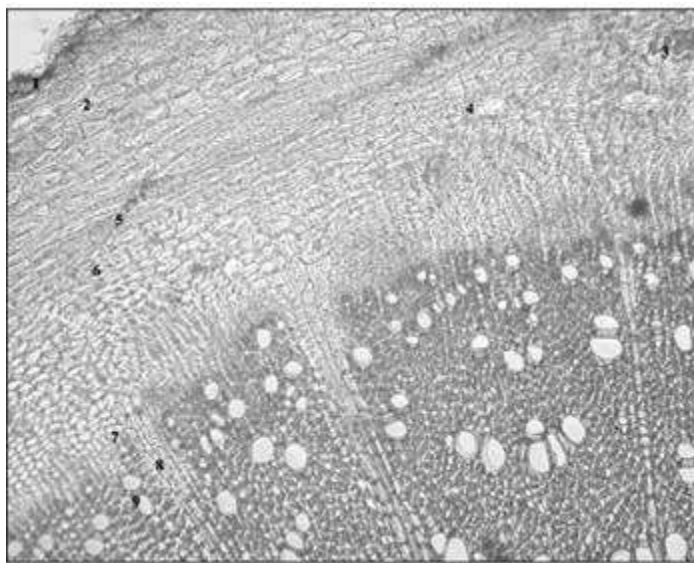
Rice. 6. Plot of the lower epidermis of the leaf *Artemisia absinthium* with T-shaped hairs (sw. x40): 1 - hair base; 2 - essential oil gland (side view); 3 - stomata; 4 - T-shaped hair with a 2-cell stem; 5 - cells of the epidermis with winding walls.

The underside of the sheet. Has a structure similar to the top side of the sheet (fig. 6).

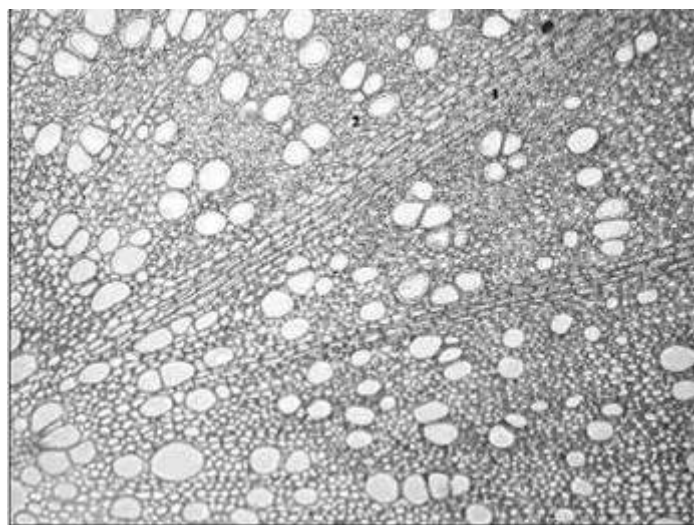
Anatomical and diagnostic signs of the root

In the very center of the root, the primary xylem is located, the number of rays of which varies. Behind it is the secondary xylem, which is an alternation of narrow and wide lumen vessels (Fig. 7). In the secondary xylem, the medullary rays are clearly visible (Fig. 7, 8), expanding towards the cambium, the number of which coincides with the primary xylem. After the secondary xylem, there is a cambium (Fig. 7), which consists of thin-walled living cells. The number of areas of the primary phloem corresponds to the number of rays of the primary xylem. Secondary phloem is represented by sieve tubes, parenchymal cells that form a soft bast, and a poorly developed hard bast, which is represented by several angular cells. Hard bast is located not only in connection with the primary phloem, but also scattered in the secondary phloem. The border of the phloem and the main parenchyma of the cortex is the pericycle (Fig. 7). The crustal parenchyma is a layer of large cells elongated in width (when viewed from the core to the periderm). Outside, the cortex is surrounded by a thin layer of peridermis (Fig. 7), which performs a protective function.

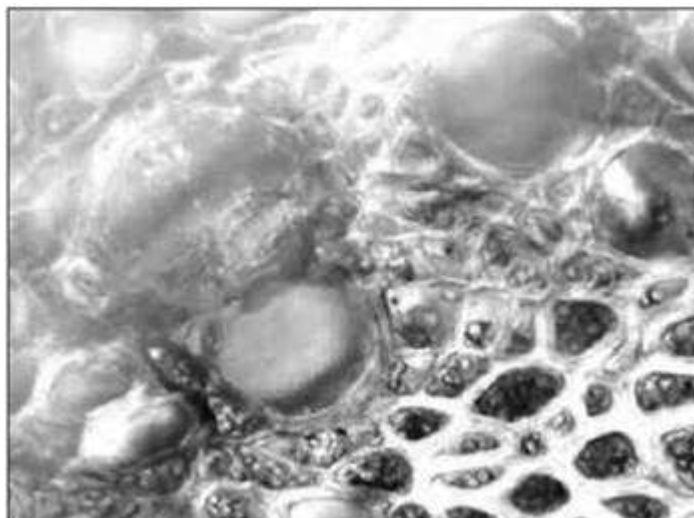
Essential oil is concentrated in special lysigenic containers (Fig. 9), which are located not only in the primary phloem, but also scattered in the secondary phloem.



Rice. 7. The root of the secondary structure *Artemisia absinthium* (uv.x10): 1 - periderm; 2 - crustal parenchyma; 3 - hard bast; 4 - container; 5 - pericycle; 6 - phloem; 7 - cambium; 8 - core beam; 9 - secondary xylem.



Rice. 8. Plot of xylem of the root *Artemisia absinthium* (uv.x10): 1 - core beam; 2 - xylem.



Rice. 9. Receptacle in the root phloem *Artemisia absinthium* (magnification x100).

CONCLUSIONS

1. Studied the external signs of leaves and grass wormwood. Based of the research carried out, an indicator of authenticity "External signs" was proposed for inclusion in the ND project "Fresh wormwood leaves and grass."
2. Studied the anatomical structure of fresh leaves and herbs of wormwood. The diagnostic signs of raw materials are revealed.
3. Studied the anatomical structure of fresh underground organs of wormwood bitter. Diagnostic signs of wormwood root were revealed, allowing to identify it from raw materials of closely related species.

LITERATURE

1. Belodubrovskaya G.A., Zhokhova E.V. Nomenclature of medicinal plants, used in homeopathy: a teaching aid. SPb., 1998.
2. State register of medicines. Volume I, II, M., 2004.
3. State Pharmacopoeia of the USSR. XI ed. M., 1989. Issue. 12.
4. Kiseleva T.L., Ageeva T.K., Tsvetaeva E.V. Homeopathic medicinal funds approved for medical use on the territory of the Russian Federation. M., 2000.
5. Kiseleva T.L., Tsvetaeva E.V., Ageeva T.K. Plants of the genus *Artemisia* homeopathy and herbal medicine. M., 2003.
6. FS 42-2094-83. Wormwood herb (Chernobyl).
7. FS 42-2434-93. Wormwood tincture.
8. FSP 42-0054-1651-01. Wormwood tincture.
9. FSP 42-0252-2475-02. Wormwood tincture.
10. FSP 42-0224-3664-02. Wormwood tincture.
11. Cherepanov S.K. Vascular Plants of Russia and Neighboring Countries (within the former USSR). SPb., 1995.
12. German Homoeopathic Pharmacopoeia (Homöopathisches Arzneibuch). Deutscher Apotheker - Verlag Stuttgart Govi-Verlag GmbH Frankfurt, 1991.
13. Pharmacopée Française. - Xe édition, 6 supplement. Agence Française De

Sécurité Sanitaire Des Produits De Santé, 1989.

Author's address

Prof., Doctor of Philosophy Kiseleva T.L.

Director of the Institute of Homeopathy and Naturotherapy FNCEC TMDL Roszdrav
127206, Moscow, st. Vuchetich, 12a
kiselevaTL@yandex.ru

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