

Morphological and anatomical study of freshly harvested raw materials
Artemisia abrotanum L. - Wormwood tree

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 Clinical and Experimental Center
traditional methods of diagnosis and treatment of Roszdrav, Moscow)

SUMMARY

The anatomical structure of freshly harvested raw wormwood (medicinal) (*Artemisia abrotanum* L.), used in domestic homeopathic practice, has been studied. Anatomical and diagnostic signs of raw materials (fresh leaves, grass and roots) of the wormwood 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: wormwood, divine tree, *Artemisia abrotanum* L., anatomical and diagnostic signs.

RESUME

The anatomic structure of Slovenwood (*Artemisia abrotanum* 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

As a fragrant and medicinal plant, wormwood was known as far back as Ancient Greece and Ancient Rome, where it was cultivated in gardens. The medicinal properties of this type of wormwood are mentioned in the works of Pliny, Dioscorides and in many other medieval medical works [11].

In the folk medicine of Russia, sagebrush medicinal has a fairly wide and varied application. It is considered an analgesic and antispasmodic agent [12]. Recommended for toothache (as a gargle and fumigation), colds, rheumatic, gastrointestinal, infectious diseases, respiratory infections, as well as intracerebral hemorrhage, convulsions, shortness of breath, tachycardia, angina pectoris, fever, rheumatism, female dizziness, dysuria, tinnitus, osteoalgia (in the form of a decoction and infusion) [2, 6, 9, 10, 12]. It is used locally to strengthen hair and as a hemostatic agent [7, 12]. There are experimental data on the presence of protistocidal and phytoncidal activity in wormwood, and antifungal and bactericidal activity in essential oil [12].

The herb and leaves of wormwood are not allowed for medical use in Russia either as a drug or as a raw material for the production of phytopharmaceuticals [3, 4].

Fresh raw material of wormwood is included in the nomenclature of homeopathic medicines in Germany (fresh young tops and leaves) [14] and France (non-lignified aerial part) [15].

In domestic homeopathic practice, freshly harvested tops of shoots and leaves collected during flowering of a plant (July-August) are used to make a matrix tincture [1, 8]. Indications for the use of God's tree wormwood in clinical homeopathic practice are: exudative pleurisy, tuberculous peritonitis and ascites, tuberculosis of the lymph nodes, chronic enteritis and diarrhea in children (on a tuberculous basis), anemia, tendency to marasmus, scrofula, gout, senile gangrene, hemorrhoids, frostbite; anthelmintic, detoxifying and appetite stimulating agent [8].

In order to develop authenticity characteristics for fresh medicinal plant raw materials (fresh aerial part) *Artemisia abrotanum* L., used in homeopathic practice, was a study of its macroscopic and anatomical and diagnostic features was carried out.

The underground part of the 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 wormwood, we also carried out a morphological and anatomical study of the underground organs of the wormwood tree.

II. MATERIAL AND METHODS

The object of this study was fresh grass and roots of wormwood divine tree. The grass and roots were collected in a meadow in the Yasnogorsk district of the Tula region; the grass was harvested in July 2004, and 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" [4].

All parts of the plant intended for microscopic examination are preserved in 90% alcohol were immediately after collection. In order to obtain a more enlightened micropreparation, we modified the pharmacopoeial technique for studying the leaf blade. 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. An Olympus Digital Camera C - 3000 Zoom (Japan) was used for photography.

III. RESULTS AND ITS DISCUSSION

External signs of freshly harvested raw materials

The wormwood herb is the leafy tops of flower-bearing stems, not containing woody parts. The flowering stems are ribbed, simple, glabrous, ending in a narrow and dense paniculate inflorescence. The inflorescence consists of small ovate-spherical baskets with a diameter of 2–2.5 mm. Outside, the baskets are covered with a wrapper; outer leaves are herbaceous, oblong-elliptical or oblong-oval, inner leaves are elliptical, widely and incised scariously-bordered along the edge.

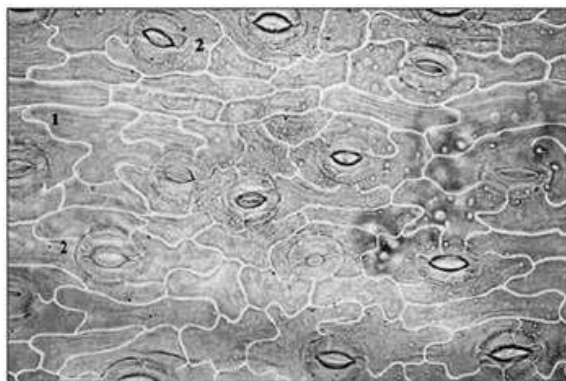
Marginal flowers are pistillate, in the amount of 8. Corolla is narrow-tubular, widened towards the base, two-toothed, punctate-glandular. The lobes of the stigma are prominent, linear, truncated, usually more or less curved. Disc flowers 14–16, corolla tubular, punctate glandular.

Leaves are alternate, simple, glabrous, 4–8 cm long and 3–6 cm wide, oval in outline, double-pinnately dissected into narrow-linear, almost filiform lobules. The bracts are pinnate, and the uppermost leaves are trifoliate to whole. The color of the stems is brownish, the leaves are blue-green, and the flowers are yellow. The smell is aromatic, refreshing. The taste is spicy bitter. Wormwood leaves divine tree petiolate, without pubescence, length 4–8 cm and 3–6 cm wide, oval in outline, double- or triple-pinnately dissected into narrow-linear, almost filiform lobules.

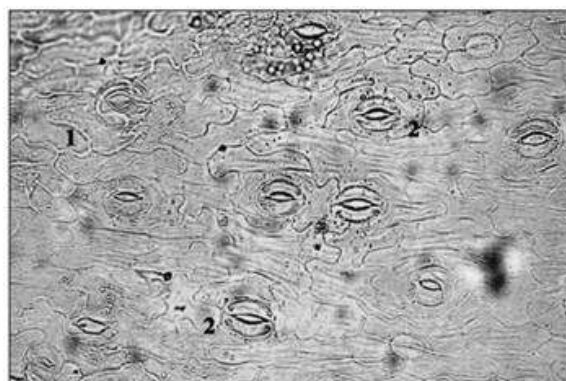
The color of the leaves is bluish green. The smell is aromatic, refreshing. The taste is spicy bitter.

Anatomical and diagnostic signs of the leaf

Epidermal cells on both sides of the leaf with winding walls (Fig. 1-4). The stomata, surrounded by 3–5 cells (Fig. 3), are numerous and located on both sides of the leaf blade (Fig. 1–4). No hairs or essential oil glands are found. Under the epidermis, numerous orange drops are visible, which are nonspecific parenchymal cells filled with essential oil (Fig. 4).



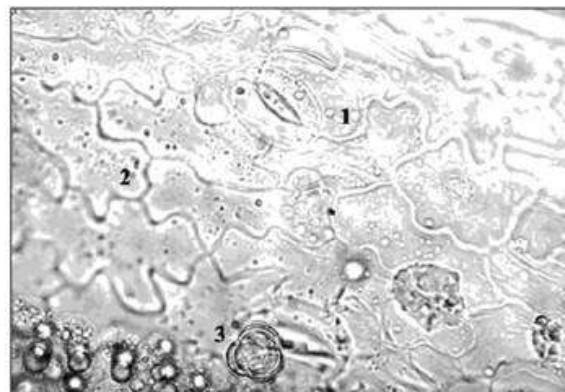
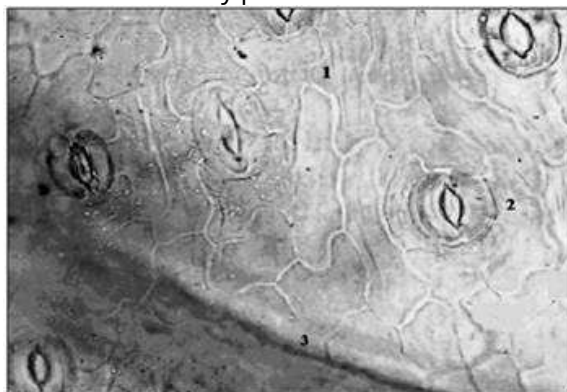
Rice. 1. Upper epidermis of the leaf *Artemisia abrotanum* (uv.xtwenty):
1 - cells of the epidermis with winding walls; 2 - stomata.



Rice. 2. Lower epidermis of the leaf *Artemisia abrotanum* (uv.xtwenty):
1 - cells of the epidermis with winding walls; 2 - stomata.

Anatomical and diagnostic signs of the root

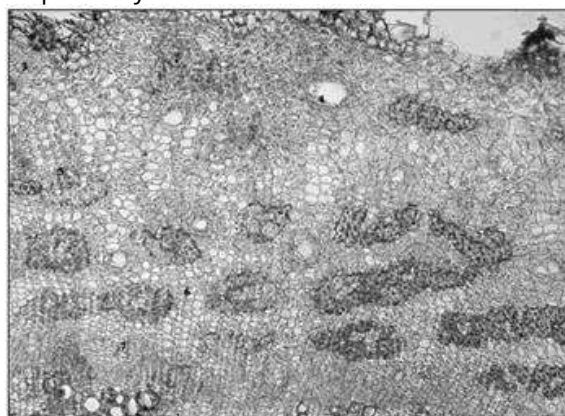
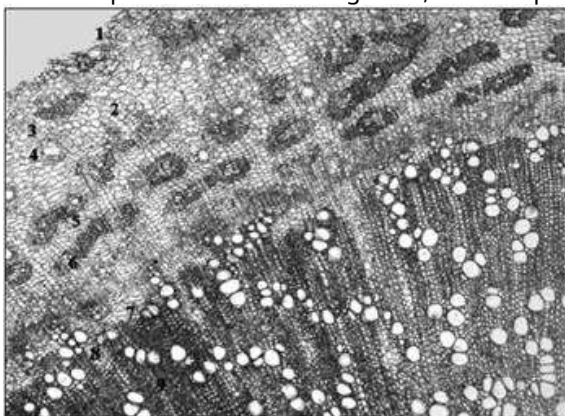
When examining a transverse section of the wormwood root, it can be seen (Fig. 5) that the primary xylem is located in the very center (Fig. 8), the number of rays of which varies. It is followed by a highly developed secondary xylem (Fig. 7), which is an alternation of narrow and wide-lumen vessels. After the secondary xylem, there is a cambium, which consists of thin-walled living cells. Secondary phloem (Fig. 6) is represented by sieve tubes, parenchymal cells that form a soft bast, and a highly developed hard bast. The sclerenchymal fibers of the hard bast are not located in a continuous layer, but are grouped into complexes under the primary phloem and are located rather close to each other, forming rings. The border of the phloem and the main parenchyma of the cortex is the pericycle. The bark parenchyma is poorly developed and consists of a thin layer of rounded cells. Outside, the cortex is surrounded by a highly developed periderm, consisting of a loose and thick layer of dark brown cells, which has scattered gray cells in its structure. The essential oil is concentrated in lysigenic receptacles. The reservoirs are also located in the secondary phloem.



Rice. 3

Rice. 3. Stomata on the upper side of the leaf *Artemisia abrotanum* (uv.x40): 1 - cells of the epidermis with winding walls; 2 - stomata, surrounded by 4 cells of the epidermis; 3 - vein.

Rice. 4. The area of the epidermis of the lower side of the leaf *Artemisia abrotanum* (uv.x40): 1 - stomata; 2 - cells of the epidermis with winding walls; 3 - non-specialized parenchymal cell.

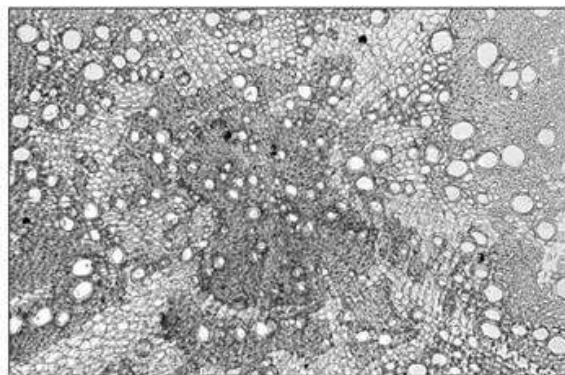
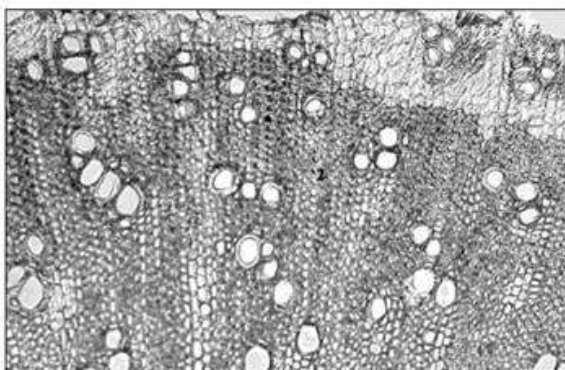


Rice. 5

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

Rice. 6

Rice. 6. Bark of the root *Artemisia abrotanum* (uv.x10): 1 - periderm; 2 - pericycle; 3 - storage parenchyma; 4 - container; 5 - hard bast; 6 - phloem; 7 - cambium; 8 - secondary xylem.



Rice. 7

Rice. 7. Central part of the root *Artemisia abrotanum* (uv. x10): 1 - cambium; 2 - secondary xylem. Rice. 8. Root core *Artemisia abrotanum* (uv.x10): 1 - core beam; 2 - primary xylem; 3 - secondary xylem.

Rice. eight

CONCLUSIONS

1. Studied the external signs of leaves and grass wormwood divine tree. Based on the of research, an indicator of authenticity "External signs" was proposed for inclusion in the ND project "Fresh leaves and grass wormwood".

2. Studied the anatomical structure of fresh leaves and grass wormwood divine tree. Based The study proposed an indicator of authenticity "Microscopy" for inclusion in the ND project "Fresh leaves and grass wormwood".

3. Studied the anatomical structure of fresh roots of wormwood divine tree. Revealed diagnostic signs of raw material of wormwood, divine tree, allowing to identify it from raw materials of closely related species.

LITERATURE

1. Belodubrovskaya G.A., Zhokhova E.V. The nomenclature of medicinal plants used in homeopathy: a methodological guide. - SPb., 1998.
2. Blinkov I.L., Kiseleva T.L., Tsvetaeva E.V. Brief Encyclopedia of Herbal Medicine. Reference for medicinal use of plants. - M., 1998.
3. State register of medicines. - Volume I, II. - M., 2004.
4. State Pharmacopoeia of the USSR. XI ed. - M., 1989. - Issue. 12.
5. Wild useful plants of Russia. - SPb., 2001.
6. Efremov A.P., Shreter A.I. Herbalist for men. - M., 1996.
7. Zamyatina N.G. The ABC of medicinal plants. - M., 2005.
8. Kiseleva T.L., Ageeva T.K., Tsvetaeva E.V. Homeopathic medicines, approved for medical use on the territory of the Russian Federation. - M., 2000.
9. Kiseleva T.L., Tsvetaeva E.V., Ageeva T.K. Plants of the genus *Artemisia* in homeopathy and herbal medicine. - M., 2003.
10. Nosal M.A., Nosal I.M. Medicinal plants and methods of their use among the people. - M., 1993.
11. One of the Men. About the properties of herbs. - M., 1992.
12. Plant resources of the USSR: Flowering plants, their chemical composition, use; Family Asteraceae (Compositae). - SPb., 1993.
13. Cherepanov S.K. Vascular plants of Russia and neighboring states (within the former THE USSR). - SPb., 1995.
14. German Homoeopathic Pharmacopoeia (Homöopathisches Arzneibuch). - Deutscher Apotheker - Verlag Stuttgart Govi-Verlag GmbH Frankfurt. 1978 Edition with 1st-4th Supplements. - P. 195-196.
15. Pharmacopée Française. - Xe édition, 6 supplément: Monographies de souches pour préparations homéopathiques. Agence Française De Sécurité Sanitaire Des Produits De Santé, 1989. P. Abrotanum.

Author's address

Prof., Doctor of Philosophy Kiseleva T.L.
FGU "FNCEC TMDL of Roszdrav" 127206,
Moscow, st. Vuchetich, 12a
kiselevaTL@yandex.ru

Morphological and anatomical study of freshly harvested raw materials *Artemisia abrotanum* L. - God tree wormwood / T.L. Kiseleva, L.N. Frolova, Zh.A. Soyunova, E.V. Konovalova, N.N. Melnikova, E.V. Tsvetaeva // Traditional Medicine. - 2009. - No. 4 (19). - P.17-20.

[To favorites](#)