

A.M. Akhmetalimova<sup>1</sup>, M.Yu. Ishmuratova<sup>2</sup>, S.A. Ivasenko<sup>1</sup>, I.V. Loseva<sup>1</sup>, A. Ludwiczuk<sup>3</sup>

<sup>1</sup>Karaganda State Medical University, Kazakhstan;

<sup>2</sup>Ye.A. Buketov Karagandy State University, Kazakhstan;

<sup>3</sup>Lublin Medical University, Poland

(E-mail: kirra\_777@mail.ru)

## Determination of anatomical diagnostic signs of aboveground parts of raw material of *Thymus eremita* Klok.

Species of genus *Thymus* are widely used as perspective medical plants with anti-oxide, antimicrobial, antiviral, acaridae activity. Introduction of new species in State Pharmacopoeia is a very important research. In present article the anatomic research of some areal bodies of *Thymus eremita* is presented. Raw material is gathered at Karkaraly Mountains (Karaganda region) in phase flowering. During the research it has been established that the studied species of a thyme possesses xero-mesophytes and xerophytes type of a structure which is expressed in a small size of epidermis cells of a leaf, existence of numerous large essential oil glandular of a rounded or oval shape, stomata are characterized by anomocytes type, are located mainly on the lower party of a leaf. The diagnostic signs of raw materials of *Thymus eremita* are determined: for a stalk — a type of the fibro vascular system, character of an arrangement and the size of a phloem and xylem, existence of a cavity; for a leaf — a structure of the top and lower epidermis, essential oil glandular, a structure of a mesophyll.

**Keywords:** *Thymus eremita*, medical raw material, anatomy, diagnostic signs, essential oil glandular, stomata, epidermis, receptacle.

Broad lands of steppes and the woods of Kazakhstan are rich with plants with the most various chemical and medicinal properties. In the practical sphere only the small share of species from positions of a botanical resources and the pharmacognostical analysis, perspective for medicine, is used. One of interesting group of plants is species from gene thyme (*Thymus* L.). Areal bodies of different species of thymes throughout centuries it is used in traditional and official medicine as expectorant and antimicrobial means in the form of liquid extract, essential oil [1]. According to literary data researches on anti-oxide [2], antimicrobial [3], antiviral [4] activities and also acaridae effects [5] of plants are found. Are included a thyme In the State pharmacopeia of the Republic of Kazakhstan are included *Thymus vulgaris* L. and *Thymus serpyllum* L. [6] whereas at natural flora there are also other species [7] which can act in quality the vicar raw materials.

So, our researches let us to recommend for introduction into State Pharmacopoeia of the Republic of Kazakhstan such species as *Thymus marschallianus*, *Th. eremita*, *Th. roseus*, *Th. lavrenkoanus*, *Th. crebrifolius*. For preparation of pharmacopeias article for these species it is necessary to study morphological structure of both plants and find the diagnostic signs for future identification of whole and crushed raw materials. The purpose of our work was the anatomic research of some aerial bodies of *Thymus eremita*.

### Methodology

Object of a research were aboveground parts (leaves and stalks and flowers) of *Thymus eremita* Klok. (*Lamiaceae* family). Raw material was collected in 1<sup>st</sup> decade of June, 2017 in phenological stage — flowering, in the territory of the Karkaraly Mountains (Karkaraly rayon of Karaganda region). Identification of sample is conducted by materials of herbarium fund of Karaganda State University named after academician Ye.A. Buketov, biological and geographical faculty.

Raw material was collected by cutting by height of 5–7 cm from soil's surface. Gathered raw materials were dried in closed room protected from sunshine insolation and at temperature 25 °C during 3–5 days. Drying raw material was packed in double paper pocket.

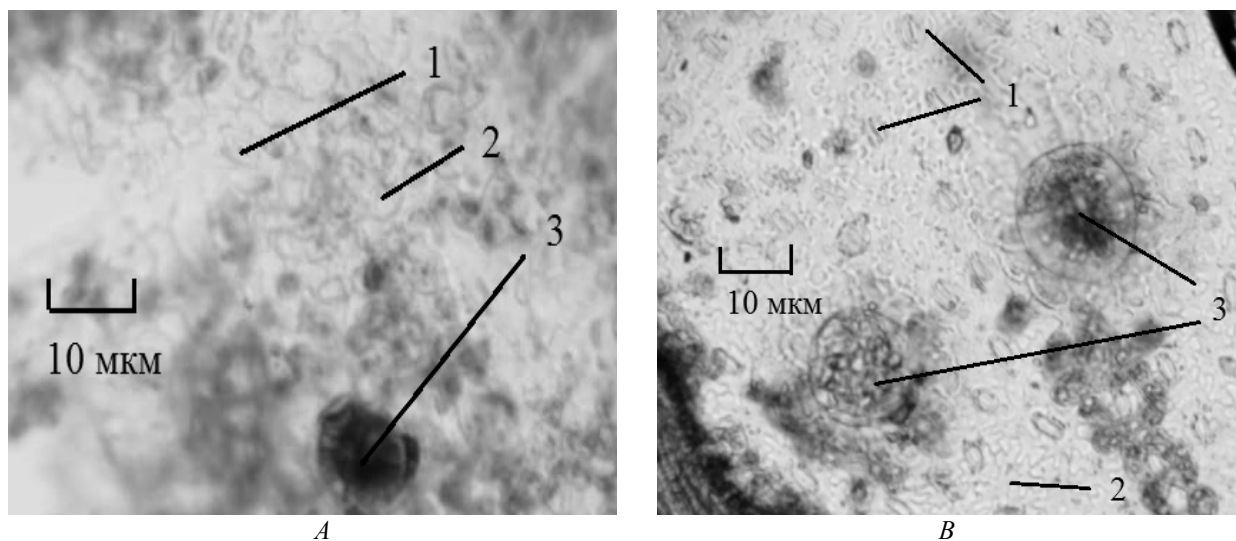
Samples of drying raw materials of *Thymus eremite* were analyzed according to standard methods of the anatomical analysis [6, 8, 9] using a binocular microscope with increasing 4×16 and 10×16. Organs of plant are fixed in solution of Straus and Fleming (ethanol 70 % : water : glycerin in composition 1:1:1). In case of the description of diagnostic signs paid attention to structure of a surface, availability of stalks, extent of omission and availability of trichomes.

Micro preparations were photographed by camera of scanning microscope «MT 4310 L» Melji-Techno, program Visual Bio, figures were carried out in Paint program, version 10.5.

*Results and discussion*

By anatomical structure *Thymus eremita* has the typical structure which are characterized for *Lamiaceae* family. The leaf is flat, form of leaf is narrowly lanceolate with a smooth edge, wedge-shaped base and pointed tip. The surface of the leaf in upper side is smooth, with the lower side is rough.

Epidermis of a leaf of *Thymus eremita* on both sides consists of twisting epidermal cells with reinforced walls and a layer of a cuticle (Fig. 1).

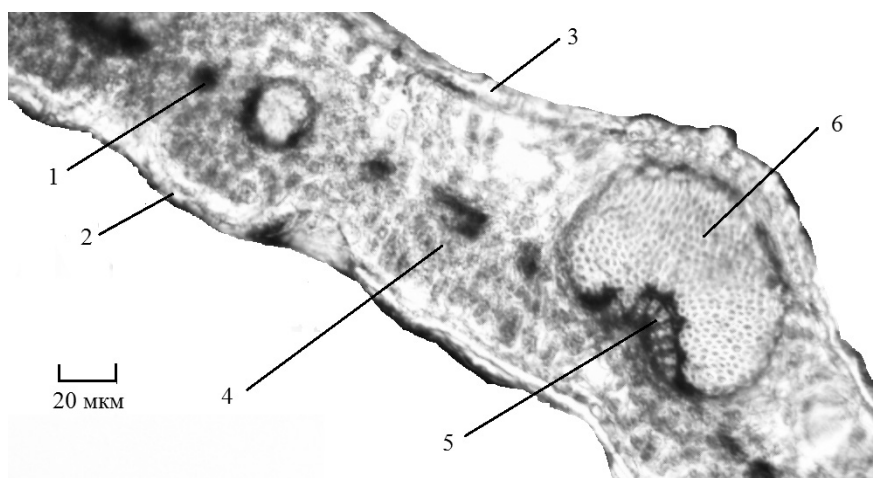


A — upper epidermis; B — lower epidermis with rise essential oil glandular; 1 — stomata; 2 — basic cells of epidermis; 3 — essential oil glandular

Figure 1. Fragment of structure of upper and lower epidermis of leaf of *Thymus eremita*. Zoom 10×16

Stomata are numerous, small, anomocytes type (stomata is surrounded with 3 or more identical cells of main epidermis), are placed on both sides of a leaf, but it is plentiful — on lower epidermis. Trichomes aren't expressed. Essential oil glandular is large, rounded shape, dark colored, and rise over a surface of epidermis. Glandular consists from 8 cells, located per 2 rows. Numbers of glands are 1–2 pieces per 1 mm<sup>2</sup> of surface of epidermis.

On a cross cut the leaf is flat, palisade type — column mesophyll is located on both sides of a leaf, and spongy mesophyll is almost not expressed (Fig. 2). This type of mesophyll is characterized for xerophytes plants. Veins are clearly visible from the underside of the leaf.



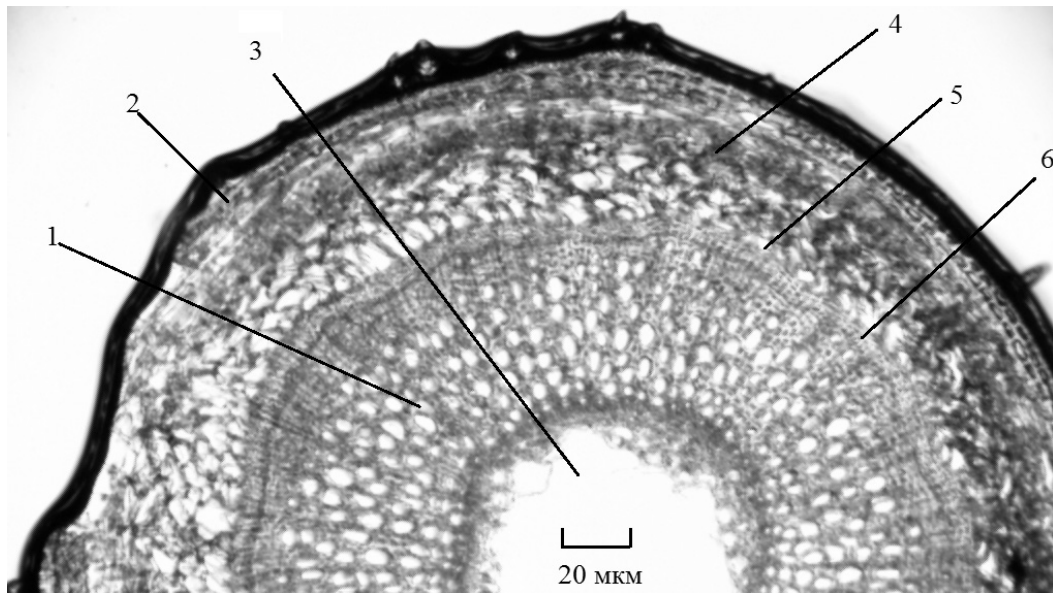
1 — schizogenic receptacles; 2 — upper epidermis; 3 — lower epidermis; 4 — palisade mesophyll; 5 — phloem; 6 — xylem

Figure 2. Cross-cut of leaf of *Thymus rasiatus*. Zoom 10×16

On both sides the leaf is covered with one-layer epidermis. Mesophyll isn't differentiated on separate fabrics, in the thickness of a leaf schizogenic receptacles are placed. Receptacles are oval or oblong shape, visible as dark colored spots. They are filled with essential oil.

The fibro vascular system is bunch type; bunches are collateral, the closed type — a xylem from below, a phloem — from above.

Stalk on a cross cut is roundish, edges are expressed poorly, inside hollow (Fig. 3). At the bottom of the stem is woody, the top part remains green.



1 — xylem, 2 — epidermis, 3 — cavity, 4 — chlorenchyme, 5 — endoderm, 6 — phloem

Figure 3. Cross-cut of stalk of *Thymus eremita*. Fragment. Zoom 10×16

The stalk on the periphery is covered with one-layer epidermis under which 2–4 layers of a chlorenchyme lie. The bark zone is separated from fibro vascular system by one-layer endoderm. The fibro vascular system is not bunch, ring type. The layer of a phloem is small by the size, consists of small cells. The xylem forms a big ring with large gleams and center beams. The central parenchyma dies off, and at adult stalks the cavity is formed.

### Conclusion

On the basis of the obtained data it is noted that the anatomic signs important for diagnostics of this species of raw materials are: for a stalk — a type of the fibro vascular system, character of an arrangement and the size of a phloem and xylem, existence of a cavity; for a leaf — a structure of the top and lower epidermis, essential oil glandular, a structure of a mesophyll.

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А.М. Ахметалимова, М.Ю. Ишмуратова, С.А. Ивасенко, И.В. Лосева, А. Людвичук

### ***Thymus eremita* Клок. дәрілік шикізатының жерүсті ағзаларының анатомиялық диагностикалық белгілерін анықтау**

Тасшөп тұқымдастар өсімдіктері тотығуға, микробқа, вирускқа қарсы және акарицидті белсендікке ие. Өсімдіктердің жаңа түрлерін Мемлекеттік фармакопеяға енгізу маңызды зерттеу болып табылады. Мақалада тасшөп өсімдіктің жерүсті ағзаларының анатомиялық зерттеу нәтижелері ұсынылған. Жұмыс барысында бұл өсімдіктің ксеромезофит және ксерофитті құрылым түріне ие екендігі белгілі болды, ол жапырақтың ұсақағзалы эпидермисінде, сопақша және дөңгеленген эфир-майлы ірі бездерде, тағы басқада көрініс тапты. Тасшөп өсімдігі шикізатының диагностикалық қасиеттеріне келесілер жатады: сабақ үшін — тамыр-өткізу жүйе түрі, флоэма және ксилема учаске өлшемі және орналасу сипаты; жапырақ үшін — жоғарғы және төменгі эпидермис құрылымы, эфир-майлы бездер, эпидермис т.б.

*Кілт сөздер:* *Thymus eremita*, өсімдік шикізаты, анатомиясы, диагностикалық белгілері, эфир-майлы ірі, саңылау, эпидермис, кең орын.

А.М. Ахметалимова, М.Ю. Ишмуратова, С.А. Ивасенко, И.В. Лосева, А. Людвичук

### **Определение анатомических диагностических признаков надземных органов сырья *Thymus eremite* Клок.**

Растения рода тимьян широко используются как перспективные лекарственные растения с антиоксидантной, антимикробной, противовирусной и акарицидной активностью. Введение новых видов в Государственную фармакопею является важным исследованием. В работе представлено анатомическое исследование некоторых надземных органов тимьяна-пустынника. Растительное сырье собрано в горах Каркаралы (Карагандинская область) в фазе цветения. В ходе исследования было установлено, что изучаемый вид тимьяна обладает ксеромезофитным и ксерофитным типом строения, которое выражается в мелкоклеточной эпидерме листа, наличии многочисленных крупных эфирно-масличных железок округлой или овальной формы, устьица характеризуются аномоцитным типом, расположены преимущественно на нижней стороне листа. Диагностическими признаками сырья тимьяна пустынного выступают следующие: для стебля — тип сосудисто-проводящей системы, характер расположения и размер участков флоэмы и ксилемы, наличие вместилищ; для листа — строение верхнего и нижнего эпидермиса, эфирно-масличные железки, форма мезофила.

*Ключевые слова:* *Thymus eremita*, лекарственное растительное сырье, анатомия, диагностические признаки, эфирно-масличные железки, устьица, эпидермис, вместилища.

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