PROCEEDINGS OF THE YEREVAN STATE UNIVERSITY

Chemistry and Biology 2021, **55**(1), p. 46–51

Biology

THE ANATOMICAL-MORPHOLOGICAL FEATURES OF OREGANO ORDINARY (*ORIGANUM VULGARE* L.) WIDELY GROWING IN THE FLORA OF ARMENIA DURING THE PRE-BLOSSOM PERIOD

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The article reports the results of microscopic studies of the oregano leaf in the pre-blossom period. In particular, the following anatomical and morphological features of the oregano leaf during the pre-blossom period were revealed: sinuous cuticle, multicellular simple trichomes, capitate trichomes, stomata, essential oil glands. The latter were located only in the central part, and were absent at the margins. The essential oil glands were of high density mostly in the central part of the raw materials preparation, which were harvested from the regions of dry climatic conditions as opposed to the raw materials harvested from the region of wet climatic conditions. The results of the investigation were definitely conditioned by the climatic features of the regions.

https://doi.org/10.46991/PYSU:B/2021.55.1.046

Keywords: Oregano ordinary, standardization, microscopic analysis.

Introduction. The merchandizing analysis lies in the base of the pharmacognostic investigation of the herbal raw material which is necessary to confirm the identity, purity and the quality of the herbal raw material.

Nowadays microscopic analysis plays a significant role in the standardization, the confirmation of the identity and the quality control of the raw materials.

Microscopic analysis gives an opportunity to distinguish between medicinal types and none medicinal types, to estimate accurately anatomical-diagnostic features, histological specific features of the crushed and powdered raw materials, to standardize producing plant and raw material by anatomical – diagnostic features, to determine the taxonomic position of the plant species.

From this perspective, today the study of natural raw materials in Armenia obtains a great significance due to the growing interest in native raw materials. The Armenian flora is rich in a great variety of plant raw materials [1].

Today several essential oil plants in the native flora, particularly *Origanum vulgare* L. belonging to the Mint family, are of significant scientific and practical interest [2].

Taking into a consideration the fact that essential oils of the earth produce four chemorases [3], the main goal was to study the anatomical features of this wildly growing plant species, especially in the flora of Armenia. The literary information

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about the latter refers only to the blossoming period of the vegetation of the plant raw material [2].

The morpho-anatomical distinguishing features of the essential oil wildly growing in the Regions of Kotayk, Lori, Tavush, Gegharkunik, were, for the first time, evaluated during the pre-blossoming period of the vegetation according to the conducted research.

The microscopic analysis of Oregano ordinary herb during the pre-blossoming period was carried out in the frame of the partial merchandizing analysis.

However, taking into account the fact that according to the researches of the raw materials results and scientific literature resources, not only the polymorphism of chemical composition, but also the significant differences in anatomical-morphological features are typical of Oregano ordinary. The latter is stipulated by the influence of climatic factors [3]. Since the microscopic analysis of the raw material of Oregano has already been carried out during the blossoming period [4], it was aimed at implementing a microscopic research during the pre-blossoming period of the vegetation as well.

Materials and Method. As a material served Oregano ordinary (*Origanum vulgare* L.) herb harvested in May–June 2016 from different regions of Armenia: Kotayk–Kaqavadzor Village (1750 *m* above the altitude, latitude N40°29′43″, longitude E 44°31′44″), Tavush–Teghut and Aknaghbyur Villages (1276 *m* above the altitude, latitude N 40°87′55″, longitude E 45°14′91″), Lori–Lorut Village (1643 *m* above the altitude, latitude N 41°05′51″, longitude E 44°27′61″), Gegharkunik–Chkalovka Village (1940 *m* above the altitude, latitude N 39°19′12″, longitude E 46°48′48″) during pre-blossoming period of individual development which are herbarilized in pharmacognosy department and registered in the Archive of RA NSA Institute of Botany under the following order numbers ERE 192245, ERE 192247, ERE 192246, ERE 191335.

Kotayk Region is characterized by temperate mountainous climatic conditions, where the amount of precipitation is significantly high – 588 *mm*, the relative humidity is 71%, the average annual temperature is 12.6–15.8°C. The region is also characterized by quite huge heat recourses and long vegetation period and is located in the agro-climatic zone V, 1700–1750 *m* above the sea level [5]. The Gegharkunik Region is located in the agro-climatic zone VII, 1325–3597 *m* above the sea level, the relative humidity – 72%, the average monthly temperature – 12.5°C, pre-blossoming period – June, the average monthly temperature – 16°C) [6, 7]. The Tavush Region is located in the agro-climatic zone V, 1100–1510 *m* above the sea level, the relative humidity – 76–79%, the pre-blossoming period is in June, the temperature – 19.9–21.10°C. The Lori Region is located in the agro-climatic zone VII, 1485–1643 *m* above the sea level, the relative humidity – 71%, the climate is humid, the temperature is 14.8–22.9°C [6, 8, 9].

Immediately after the harvest the primary processing was carried out: the removal of the organic and mineral mixtures, the washing, drying of herbal raw materials [10].

The microscopic analysis was carried out according to “The technique of microscopic analysis” method. The leaf of the plant is considered to be an object for the microscopic investigation of the herb raw material [11, 12].

For the definition of anatomical-morphological features microscopic analysis of Oregano ordinary herb was carried out by tri-ocular electronic Micros microscope and Olympus Digital Camera C-3000 Zoom camera, with 2×20, 6×20, 8×20, 10×20, 6×40 magnifications.

The analysis was carried out at YSMU Pharmacognosy Department and YSMU Scientific – Research Center.

Results and Discussion. The analysis of the microscopic preparations of Oregano ordinary leaves which were harvested from the four regions of Armenia (Tavush, Lori, Kotayk, Gegharkunik) in May–June 2016, during the pre-blossoming period showed that the results were different in different regions and stages of vegetation.

The microscopic analysis revealed that the cuticle of the epidermis of the upper surface of the Oregano ordinary leaf harvested from Lori Region (Lorut Village) appeared to be sinuous which is typical of the preparation of Oregano. The polygon cells which are typical of the Oregano leaf, are not well expressed on the lower surface of the epidermis. Along the veins multi-cellular, acute cone-shaped and knee-shaped trichomes were visible. Oil glands of not a great density were mainly located in the central part of the leaf and were almost invisible at the margins. This may be accounted for the wet climatic conditions of Lori Region, as well as the stage of individual development. The intracellular spaces were well expressed, which is typical of the wet climate and stomata were few, which again is typical of the plants growing in wet regions (Fig. 1).

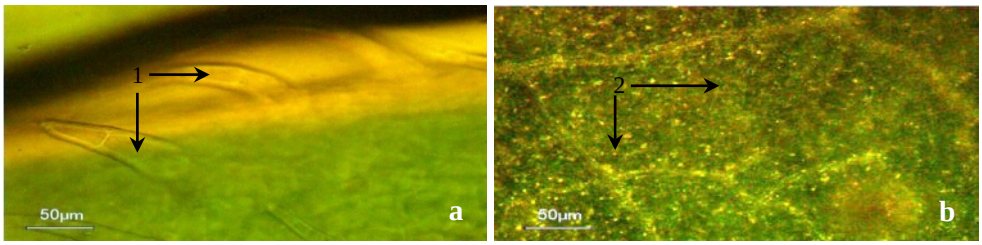

Fig. 1. a) 1 – Multi-cellular simple trichomes (2×20); b) 2 – sinuous cuticle (8×20).

In the microscopic preparation of the Oregano ordinary leaf harvested from Tavush Region (Karmir Aghbyur), it was obvious, that the cuticle of the upper epidermis was not expressed. Large amount of trichomes, which were responsible for the water evaporation were visible. Polygen cells of the lower epidermis were visible, as well as stomata, which are responsible for transpiration. The low quantity of the stomata is an intangible indicator of the wet climatic conditions (Fig. 2).

In the microscopic preparation of the Oregano ordinary leaf harvested from Gegharkunik Region (Chkalovka Village) unlike that of the previous two regions, the oil glands of a great density were visible in the central part of the upper surface of the leaf, whereas they were invisible at the margins. Dry climate promoted the adaptation of the plant. Considerable amounts of oil glands as well as the diacyt type stomata were obvious on the lower surface of the leaf preparation, which were surrounded with the two cells vertically located on the stomata hole. In the central part of the epidermis head-shaped trichomes were well visible with unicellular stalk and unicellular head. Pigments were noticeable as well (Fig. 3).

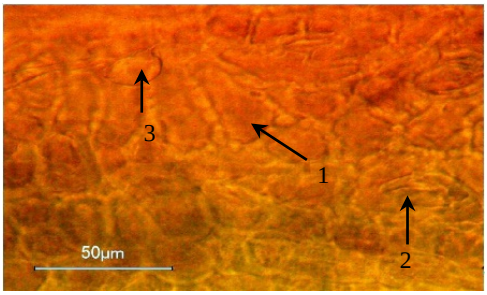

Fig. 2. 1) polygon cells of epidermis (6×40);
2) stomata (6×40);
3) tightening place of the simple trichome (6×40).

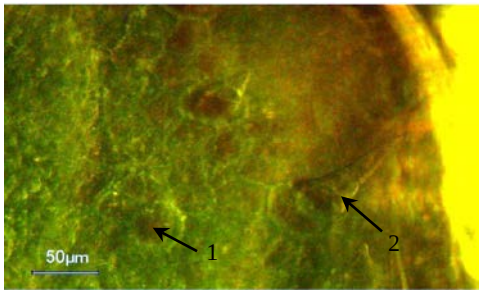

Fig. 3. 1) oil glands (10×20);
2) capitate trichomes (10×20).

The preparation of the Oregano ordinary leaf harvested from Kotayk Region (Hrazdan Town), the following striking anatomical-diagnostic features: visible oil glands on the upper surface, acute cone-shaped unicellular and multicellular trichomes, a small number of capitate trichomes and stomata (Fig. 4).

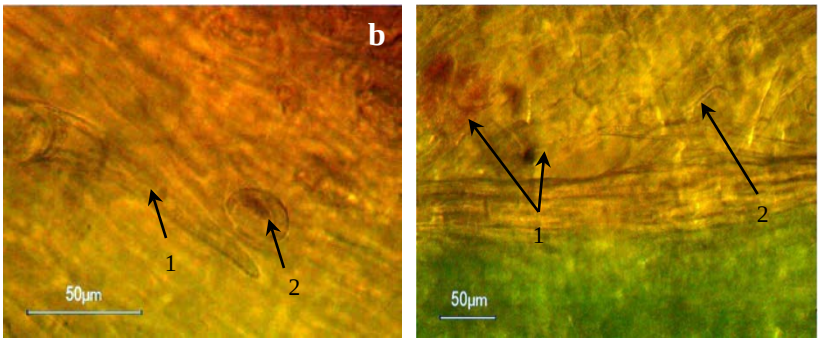

Fig. 4. a) 1 – acute cone-shaped trichome (6×20);
2 – oil glads (6×20);
b) 1– pigments;
2 – simple trichomes (6×20).

Conclusion. Comparing the results obtained with the results of the microscopic analysis of the blossom period and the literary data, we come to the conclusion that the following is characteristic of the pre-blossom period:

1) the diacytic type of stoma is not clear;
2) the oil glands seldom develop sockets with 8 cells on the place of fixation;
3) the visible oil glands are without a unicellular stalk.

Received 26.10.2021
Reviewed 04.02.2021
Accepted 18.02.2021

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ՀԱՅԱՍՏԱՆԻ ՓԼՈՐԱՅՈՒՄ ՎԱՅՐԻ ԱՃՈՂ ԽՆԿԱԾԱՂԻԿ ՍՈՎՈՐԱԿԱՆԻ (*ORIGANUM VULGARE* Լ.) ՁԵՎԱԲԱՆԱԱՆԱՏՈՄԻԱԿԱՆ ՀԱՏԿԱՆԻՇՆԵՐԸ ՄԻՆՉԾԱՂԿՄԱՆ ՇՐՋԱՆՈՒՄ

Մանրադիտակային հետազոտության արդյունքները մինչծաղկման շրջանում արձանագրեցին խնկածաղիկ սովորականի տերևի հետևյալ ձևաբանաանատոմիական հատկանիշները գորտնուկավոր կուտիկուլա, բազմաբջիջ պարզ մազիկներ, գլխիկավոր մազիկներ, հերձանցքներ, եթերայուղային գեղձիկներ: Եթերայուղային գեղձիկները կենտրոնական մասում են միայն, եզրերում բացակայում են: Կենտրոնական մասում մեծ խտության են (միավոր մակերեսում) չոր կլիմա ունեցող մարզերում, իսկ սակավաթիվ՝ խոնավ բնակլիմայական պայմաններում: Հետազոտության արդյունքները միանշանակ պայմանավորված են մարզերի բնակլիմայական առանձնահատկություններով:

А. В. МОГРОВЯН

АНАТОМО-МОРФОЛОГИЧЕСКИЕ ОСОБЕННОСТИ ДИКОРАСТАЮЩЕЙ ДУШИЦЫ ОБЫКНОВЕННОЙ (*ORIGANUM VULGARE* L.) ФЛОРЫ АРМЕНИИ В ПЕРИОД ДО ЦВЕТЕНИЯ

Результаты микроскопического исследования сырья душицы обыкновенной в период до цветения показали следующие анатомо-морфологические особенности: бородавчатая кутикула, многоклеточные простые волоски, головчатые волоски, устьицы, эфиромаслечные железки. Эфиромаслечные железки в большом количестве находятся в центре, а по краям отсутствуют. В центральной части они высокой плотности (на единицу площади) в микроскопических препаратах сырья, собранного в регионах с сухими климатическими условиями, и немногочисленны в сырье, собранном в регионах с влажными климатическими условиями. Результаты исследований однозначно обусловлены климатическими особенностями регионов.