UDC: 615.322.322(479.25):582

THE ANATOMICAL MORPHOLOGICAL FEATURES OF OREGANO ORDINARY (ORIGANUM VULGARE L.) WILDLY GROWING IN THE FLORA OF ARMENIA DURING THE FRUITING PERIOD

Moghrovyan A.V.
YSMU, Department of Pharmacognosy

Received: 25.06.2021, reviewed: 22.07.2021, accepted: 27.10.2021

Keywords: *Oregano ordinary, microscopic analysis, identification, fruiting period of vegetation.*

The most important process of studying native raw material resources has a strategic significance. At the same time, today, the expansion of the range of the medicinal raw materials, and the demand for their efficiency is growing. Additionally, the demand for the merchandising analysis, the quality control, and the standardization of the medicinal raw materials is increasing. Today, new modern approaches to standardization of the medicinal raw materials are built on a new basis. Targeted ways of improving new methods of standardization are being developed [3].

There are about 60 species of oregano in the world of flora [6]. The genus Oregano was first described by Linnaeus in 1754, and was identified by Ietswaart in 1980. In the past 150 years, this plant species was given more than 300 scientific names [5]. The resourcological research of oregano ordinary in different regions of Armenia has been carried out by GARP organization [1].

We have standardized the raw material of Oregano ordinary according to the quality digital indexes [12, 13], the quantitative content of the essential oil [7], and the sum of the extractable substances [8, 9].

From the perspective of modern analysis, microscopic analysis has a major impact on the quality control, identification, and the standardization of the raw material [2]. It enables us to expose the producing plant and the raw material species to pre-standardization according to anatomical diagnostic features. From the aspect of microscopic analysis, the anatomical-morphological features of Oregano ordinary are confirmed in Russian and European pharmacopoeias and refer only to the blossoming period [4, 16]. According to the resourcological research and the data from scientific sources, the polymorphism of the chemical composition and the morphological-anatomical features is typical of Oregano ordinary, which is attributed to the influence of climatic factors [17]. We have standardized the raw material according to anatomical diagnostic features during the pre-blossoming and blossoming periods [10, 11].

The aim of the study is to standardize the herb of Oregano also during the fruiting periods of vegetation.

*** ADDRESS FOR CORRESPONDENCE**

A.V. Moghrovyan
YSMU, Department of Pharmacognosy
Address: *2 Koryun Street, 0025, Yerevan, Armenia*
E-mail: *armine.moghrovyan@mail.ru*
Tel.: *(+374) 60 90 59*

Material and methods

The material of study was the 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 N 40°29 43 , longitude E 44°31 44), Tavush-Teghut and Aknaghbyur villages (1276m 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 the pre-blossoming period. It's registered in the Archive of RA NSA Institute of Botany under the following order numbers ERE 192245, ERE 192247, ERE 192246, ERE 191335.

Immediately after the harvest, the primary processing is carried out, such as removal of the organic and mineral mixtures, washing and drying of herbal raw materials [18].

The microscopic analysis was carried out according to the "technique of microscopic analysis". The leaf of the plant is considered to be an object for the microscopic investigation of the herb raw material [14, 15].

For the definition of anatomical-morphological features, the microscopic analysis of Oregano ordinary herb was carried out by the tri-ocular electronic microscope "Micros" and the camera "Olympus Digital Camera C-3000 Zoom" (magnifications x20, x40).

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

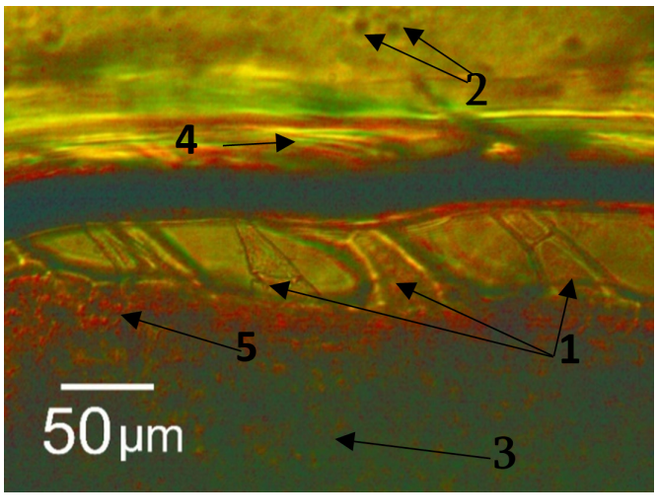

Fig. 1 *(magx20)1-multicellular simple trichomes with attachment bases, 2-crystals of calcium oxalate, 3-warty cuticle, 4-transporting tissue, 5-pigments*

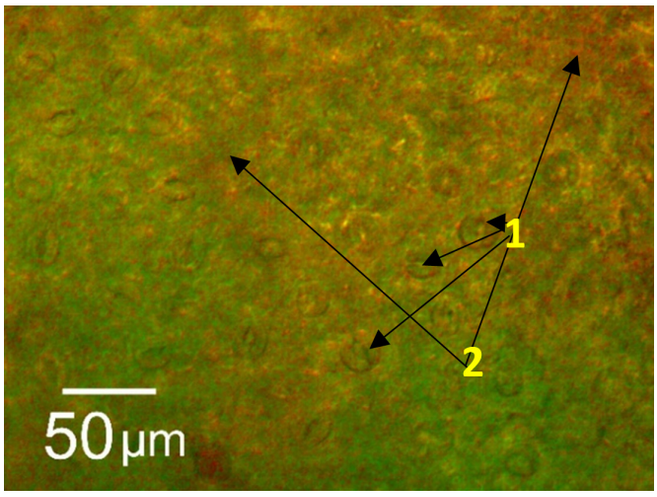

Fig. 2 *(magx40)1.-diacytic stomata, 2-wrinkled cuticle*

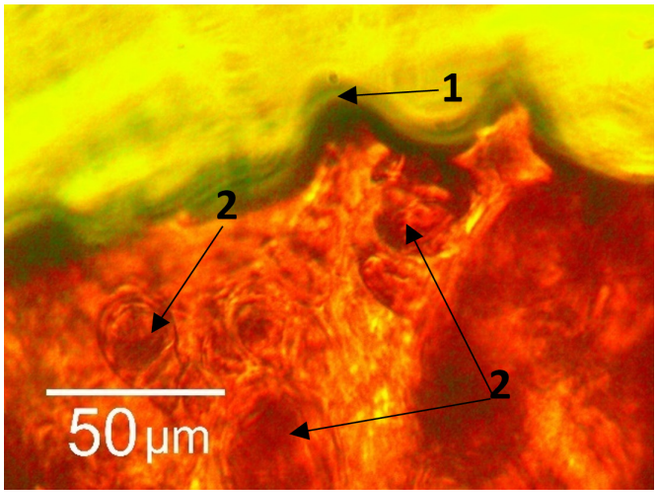

Fig. 3 *(magx40) 1-sinuous cuticle, 2-oil glands without functional significance*

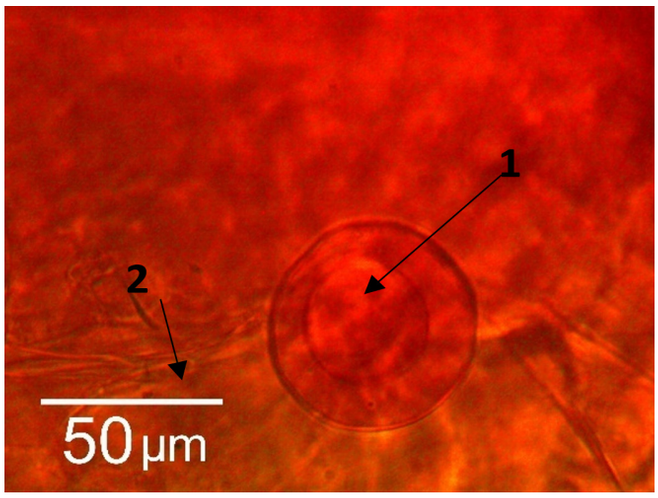

Fig. 4 *(magx40) 1.-oil glandwith transparent hollow stalk, 2-branched trichome*

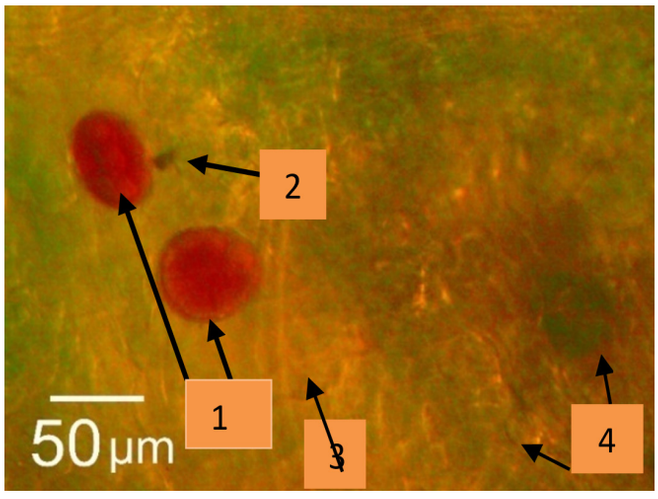

Fig. 5 *(magx20) 1.-storages, 2.-crystal of calcium oxalate, 3.-simple trichome, 4.-polygonal cells of the epidermis*

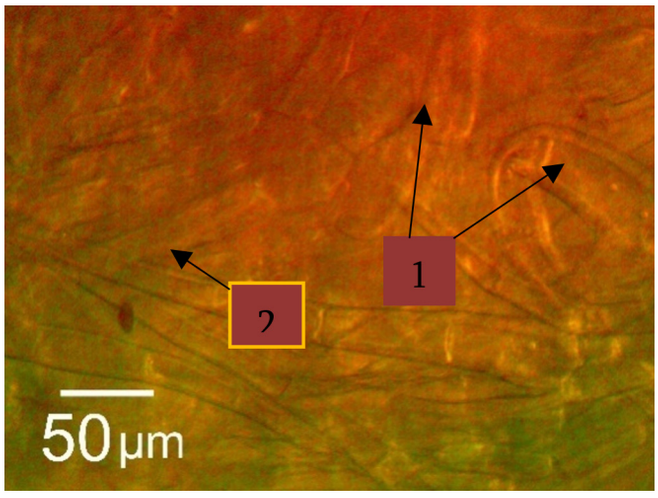

Fig. 6 *(magx20)1.-acute cone-shaped and knee-shaped simple trichomes, 2.-pigment*

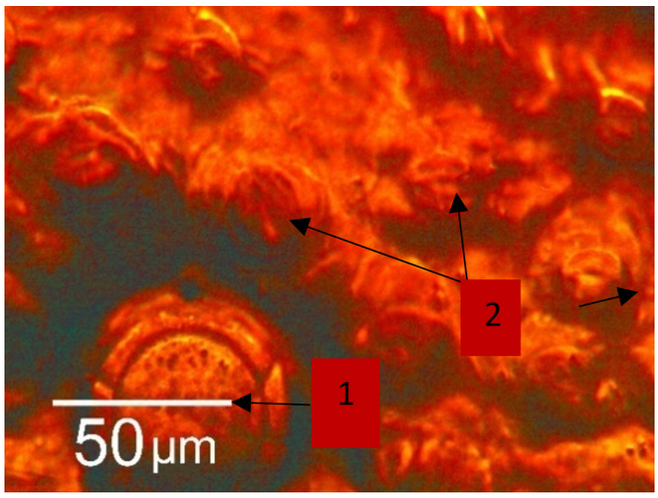

Fig. 7 *(magx40)1-oil gland with transparent hollow stalk, 2-stomata*

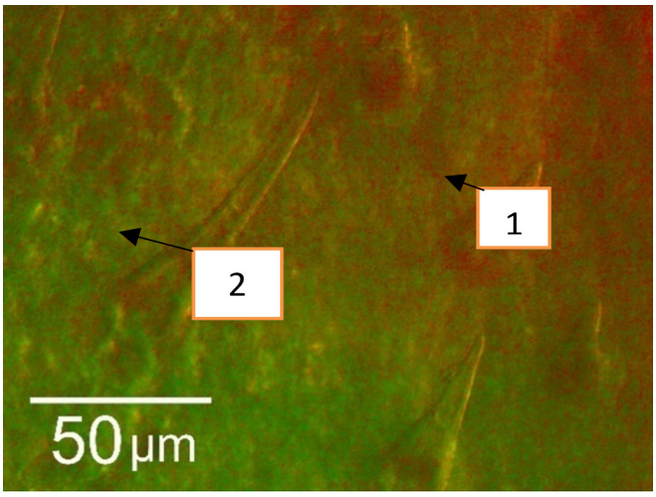

Fig. 8 *(magx40) 1-one-headed trichome, 2-tri-headed trichome*

Analysis of the Research Results

The Anatomical-Morphological Features of Oregano Ordinary Leaf in Seeding Period

The upper surface of the epidermis of the Oregano ordinary leaf harvested from Lori region is lightly sinuous, sometimes with visibly thickened wall cells. The cuticle is warty. The transporting tissue, pigments, and crystals of calcium oxalate are obvious. The multicellular simple trichomes with attachment bases are arranged along the wall which are noticeable at the margins of the leaf, whereas the epidermal cells of the leaf lower surface are with sinous walls, and the epidermis is roughly warty (fig. 1).

The epidermis of the upper surface of the Oregano ordinary leaf harvested from Tavush region is warty, the walls are lightly sinuous. The oil glands which are with transparent, hollow stalk rarely form sockets with eight cells on the place of fixation. The latter is typical of the fruiting period. The wrinkled cuticle is expressed. The lower surface of the epidermis is warty. The diacytic stomata which are surrounded with the two cells of the epidermis are of a great number. The intercellular spaces are well expressed, which is conditioned by humid climate (fig. 2).

The upper surface of the epidermis of the Oregano ordinary leaf harvested from Gegharkunik region has warty, sinuous cuticle. The polygonal cells of the lower surface of the epidermis are with lightly sinuous walls. A large number of branched trichomes stipulate the plant transpiration during the fruiting period. Diacytic stomata are not noticeable which proves the decrease of gas exchange of the plant. Both the oil glands having lost their functional significance and the ones with transparent, hollow stalk, and head are encountered. Probably, the latter is typical of fruiting period. The intercellular spaces are very small since the climate in the region is dry (fig. 3, 4).

The cells of the epidermis in the microscopic preparation of Oregano ordinary leaf, harvested from Kotayk region are polygonal. The oil glands are very few and rarely form sockets as the biochemical processes cease at that stage. The knee-shaped, multicellular, simple trichomes are of a great number. The acute cone-shaped simple trichomes are visible which are multiple and are located only at the margins of the leaf. The headed trichomes (one-headed and tri-headed), diacytic stomata, and storages were revealed in the central part. (fig. 5, 6, 7, 8).

The results of the microscopic analysis provide evidence of the influence of climatic factors on the plant tissues. Particularly, unlike humid climatic conditions (Tavush Lori), the plant tissues in dry climatic conditions (Gegharkunik, Kotayk), obtain adaptation during the ontogenesis, which provides the viability of the plants due to the following anatomical-morphological features: a great number of stomata, significantly thickened cuticle, and a great deal of trichomes.

Conclusion

The results of the investigation have shown that the changes of the anatomical-morphological features of Oregano ordinary wildly growing in the flora of Armenia are obviously dependent on the influence of the climatic factors during the fruiting period. The anatomical diagnostic features, which are typical of this period, are as follows:

- the epidermis is characterized by lightly sinuous thickened walls,
- the cuticle is wrinkled,

- diacytic stomata are visible, particularly in Kotayk region,
- the knee-shaped, acute cone-shaped and branched simple trichomes are of a great number,
- the unicellular hollow stalks of the oil glands are mainly well expressed, and the nodular structure of the heads are rarely noticed.

REFERENCES

1. Abrahamyan A., Barsevskis A., Crockett S., Melikyan A. Distribution of Origanum vulgare L. and population dynamics during the last decade in Armenia. J. Life Sci., 2014; 8: 690-8
2. Daironas Zh.V., Zilfikarov I.N. The morphological anatomical investigation of heb Onosma Armeniaca. Pharmacy 2., 2012, pp. 23-25 [In Russian]
3. Drozdova I.L, Sukholinov U.A. The standardization of medicinal raw material of several representatives of the family Rosaceae. Web of Scholar, ISSN 2518-167X, 4(22), V. 2, pp. 53-55, 2018 [In Russian]
4. European pharmacopoeia. 5th ed. suppl. 5.2. Strasbourg, European Pharmacopoeia Commission, 2005
5. Ietswaart J.H. A Taxonomic Revision of the Genus Origanum (Labiatae). Leiden University Press: The Hague, 1980; V. 4, p. 158
6. Leyva-L pez N., Guti rrez-Grijalva E.P., Vazquez-Olivo G., Heredia J.B. Essential oils of oregano: Biological activity beyond their antimicrobial properties. Molecules 2017; 22(6): 989.[http://dx.doi.org/10.3390/molecules22060989] [PMID: 28613267]
7. Moghrovyan A.V. Qualitive analysis of Oregano ordinary herb (Herba Origani vulgaris) essential oil in various periods of vegetation. // YSMU, Scientific articles collection, Yerevan, 2014, pp. 67-71 [In Armenian]
8. Moghrovyan A.V. The analysis of the quantitative content of the extractable substances of Oregano ordinary herb. Pharma N 10, Yerevan, 2015, pp. 28-31 [In Armenian]
9. Moghrovyan A.V. The standardization of wild lygrowing Oregano (Herba Origani vulgaris) by extractive substances // Medicalscience of Armenia V. LV, 2, 2015, pp. 128-134 [In Russian]
10. Moghrovyan A.V. 2021. The anatomical-morphological features of Oregano ordinary (Origanum vulgare l.) widly growing in Armenian flora during the pre-blossoming period. Proceedings of the YSU B: Chemical and Biological Sciences 55 (1 (254):46-51. https://doi.org/10.46991/PYSU:B/2021.55.1.046.
11. Moghrovyan A.V., Chichoyan N.B., Dumanyan K.H. Microscopic analysis of Oregano ordinary (Origanum vulgare L.) gathered from different regions of Armenia // Medicine, science and education. Scientific and informational journal. April, 11, Yerevan, 2012, pp. 67-72 [In Armenian]
12. Moghrovyan A.V., Chichoyan N.B., Galstyan H.M. The standardization of Oregano ordinary herb (Herba Origani vulgaris L.) wildly growing in different regions of Armenia// YSMU, Scientific articles collection, Yerevan, 2013, pp. 56-61 [In Armenian]
13. Moghrovyan A.V., Chichoyan N.B., Sargsyan E.D., Vardanyan A.P., Galstyan H.M. Influence of growing different conditions on the good-quality indices of Oregano ordinary herb (Herba Origani vulgaris L.) // Bulletin of National Agrarian University of Armenia, V. 4, Yerevan, 2017, pp. 31-33
14. Pharmacognosy. Study Practice editied by I.A. Samilina, A.A. Sorokina// M.: OOO, Edition “MIA”, 2011, ISBN: 975-5-9986-0044-9, 432 p. [In Russian]
15. Samilina I.A., Anosova O.G. Pharmacognosy, ATLAS // Ed. “Media”, V 2, 2007, pp. 47-54 [In Russian]
16. State pharmacopoeia XIII, V. 2, Moscow, 2015, 1004 p. [In Russian]
17. Werker E., Putievsky E., Ravid U. The Essential Oils and Glandular Hairs in Different Chemotypes of Origanum vulgare L. // Ann. Bot., 1985, V. 55, N 6, pp. 793-801
18. World Health Organization. Quality control methods for herbal materials // Malta, 2011, 173 p.

ԱՄՓՈՓՈՒՄ

ՀԱՅԱՍՏԱՆԻ ՖԼՈՐԱՅՈՒՄ ՎԱՅՐԻ ԱՃՈՂ ԽՆԿԱԾԱՂԻԿ ՍՈՎՈՐԱԿԱՆԻ (*ORIGANUM VULGARE L.*) ՁԵՎԱԲԱՆԱԱՆԱՏՈՄԻԱԿԱՆ ՀԱՏԿԱՆԻՇՆԵՐԻ ԱՌԱՆՁՆԱՀԱՏԿՈՒԹՅՈՒՆՆԵՐԸ ՍԵՐՄՆԱԿԱԼՄԱՆ ՇՐՋԱՆՈՒՄ

Մողրովյան Ա.Վ.
ԵՊԲՀ ֆարմակոգնոզիայի ամբիոն

Բանալի բառեր՝ *խնկածաղիկ սովորական, մանրադիտակային վերլուծություն, նույնականացում, վեգետացիայի սերմնակալման շրջան:*

Յուրաքանչյուր դեղաբուսական հումքի ֆարմակոգնոստիկական հետազոտության հիմքում ապրանքագիտական վերլուծությունն է, որի շրջանակներում իրականացված մանրադիտակային հետազոտությունը հնարավորություն է տալիս խնկածաղիկ սովորականին ստանդարտավորելու սերմնակալման շրջանում՝ ըստ ձևաբանաանատոմիական խմբերի: Դրանք բուսահումքի անատոմիական տարբերակիչ հատկանիշներն են՝ հաստացած պատերով թույլ գալարուն էպիդերմիսը, արտահայտված կնճռոտ կուտիկուլան, լավ նկատվող դիացիտ տեսակի հերձանքները, սակավաթիվ եթերայուղային գեղձիկները՝ միաբջիջ, սնամեջ ոտիկներով, գլխիկների հազվադեպ վարդակային կառուցվածքով:

РЕЗЮМЕ

АНАТОМО-МОРФОЛОГИЧЕСКИЕ ОСОБЕННОСТИ ДИКОРАСТУЩЕЙ ДУШИЦЫ ОБЫКНОВЕННОЙ (*ORIGANUM VULGARE L.*) ФЛОРЫ АРМЕНИИ В ПЕРИОД ПЛОДОНОШЕНИЯ

Могровян А. В.
ЕГМУ, Кафедра фармакогнозии

Ключевые слова: *душица обыкновенная, микроскопический анализ, идентификация, вегетационный период плодоношения.*

В основе фармакогностического изучения каждого лекарственного сырья лежит товароведческий анализ. В рамках последнего проведение микроскопического исследования позволяет осуществить предварительную стандартизацию душицы обыкновенной по анатомо-диагностическим признакам в период плодоношения. Предварительная стандартизация включает анатомо-морфологические отличительные черты растения в период плодоношения. В частности, наблюдаются эпидермис со слабо утолщенными, извилистыми стенками; морщинистая кутикула; выраженные диацитические устьица в значительном количестве; крючковидные, остроконечные конические и ветвистые трихомы в большом количестве; одноклеточные прозрачные протоки («ножки») эфирно-масличных железок выражены в основном хорошо, а узелковая структура головок, образующих розетку, отмечается редко.