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Оглавление

Айгуль Н., Слипченко Г. Д.....	592
Быкасова В. В., Орловецкая Н. Ф.	595
Вострикова А. М., Криштанова Н. А.....	599
Гайворонская Ю. В., Фастова О. Н.	602
Гречаная Е. В.*., Сербин А. Г***., Фуклева Л.А.**., Бас Я. Н.	609
Давронов Н. Р., Ромась Е. П.	611
Дуюн И. Ф., Лукина И. А.....	616
Зегхдани Е. З. А., Шакина Л. А., Малоштан Л. Н., Яценко Е. Ю.....	620
Карпец И. С., Целуйко В. И., ассист. Шевелева О. А., ассист. Давыдов А. В.....	624
Карпец И. С., Целуйко В. И., канд. хим. наук, доц. Лахвич Ф. Ф.	627
Клименко Т. В., Червоненко Н. М.....	631
Верба Д. П., Князевич П. С., Гоцуля А. С.	634
Конова О. Д. ¹ , Ласачко В. А. ² , Асоскова А. В. ² ,	637
Коноваленко И. С., Половко Н. П.....	640
Косик Д. Ю., Романова И. С.	643
Malugina E. A., Smoilovska G. P.	647
Московченко О. Ю., Ковалева Т. Н.....	651
Мудрик И. М., Яценко Е. Ю., Шакина Л. А., Малоштан Л. Н.....	655
Пирлик Д. А., Данькевич О. С.....	661
Погреева Ю. А., Криштанова Н. А.	665
Попова Я. В. ¹ , Лукина И. А. ²	668
Сафиуллина К. В., Колодязная В. А.....	672
Томаровская Л. Ю., Баярка С. В.,* Карпушина С. А.*	677
Уидани Басам	681
Хаддат А. А., Зубченко Т. Н.....	685
Хортецкая Т. В., Смойловская Г. П.	689
Шехавцова Е. В., Зуйкина С. С.	693

MICROSCOPIC DIAGNOSTIC STUDY OF INFLORESCENCES OF TAGETES ERECTA PLENA L.VAR. «HAWAJI»

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Keywords: *Tagetes erecta*, flowers, microscopy investigation.

Резюме: *были определены микроскопические диагностические признаки соцветий бархатцев прямостоячих высокорослой формы сорта «Гавайи». Основными микроскопическими диагностическими признаками Tagetes erecta plena L. var. «Hawaji» являются особенности строения эпидермы, характер устьичного аппарата, волосков, секреторных структур.*

Resume: *the microscopic diagnostic signs of inflorescences of Tagetes erecta plena L. var. «Hawaji» were determined. The main microscopic diagnostic signs of Tagetes erecta plena L. var. «Hawaji» are features of the structure of the epidermis, stomata apparatus, trichomes, secretory elements.*

Relevance. Microscopic analysis of herbal raw materials is an important stage for definitions of quality the plant raw materials [1, 2]. The microscopic analysis is an obligatory part of the pharmaceutical analysis of herbal raw material in the State Pharmacopoeia of Ukraine [1].

Tagetes erecta L. are one of the widely distributed species of the genus *Tagetes* L. on the area of Ukraine. The inflorescences of *Tagetes erecta* L. are valuable plant raw materials for production phytopreparations due to the high content of carotenoids, flavonoids, hydroxycinnamic acids, amino acids, tannins, essential oil, microelements [3].

Despite the knowledge accumulated by the world scientific society, microscopic signs of varieties species of the genus *Tagetes* L. have not been studied enough.

The aim: determination of main microscopic diagnostic signs of inflorescences of *Tagetes erecta plena* L. var. *Hawaji*.

Materials & methods. For determination of diagnostic microscopic signs of herbal raw material *Tagetes erecta plena* L. var. «Hawaji» was used the plants collected on territory of Ukraine in period of active flowering (July-September) in 2016. Fresh herbal raw material of *Tagetes erecta plena* L. var. «Hawaji» was fixed in mixture ethanol : glycerin : water distilled (1:1:1). Making and research of microscopic preparations of herbal raw material was conducted with generally accepted methods [1, 2]. Clarification by chloral hydrate was used in according of State Pharmacopoeia of Ukraine [2].

It was analyzed transversal cuts, preparations from surface and epidermis the different organs of plants. The cuts were made from the fixed materials leaves, stems, flowers, wrapping leaves and sepals. These cuts were situated on subject glass in the drop of glycerin and covered with integumentary glass.

The microscopic preparations was investigated by the microscopes of «MIKROmed» XS 3330 and RV-2610 (glasses of inc.x15, inc.x10; lenses of inc.x4,

inc.x10, inc.x40). For fixing of results was used the video camera (5,0 Mp) and digital photcamera Samsung PL50.

The research was conducted in statistically reliable amounts (ten experiments for every microscopic preparation) and conducted statistical analysis of the got results.

Results and discussion. At a microscopic examination of inflorescences *Tagetes erecta plena* L. var. "Hawaji" was installed the main anatomical and diagnostic signs.

The epidermis of ligulate and tubular flowers corolla contains a lot of chromoplast. The epidermis of the abaxial side of petal of the lingual flower is papillary (fig. 1). Epidermal cells are large and alive with thin weakly sinuous walls.

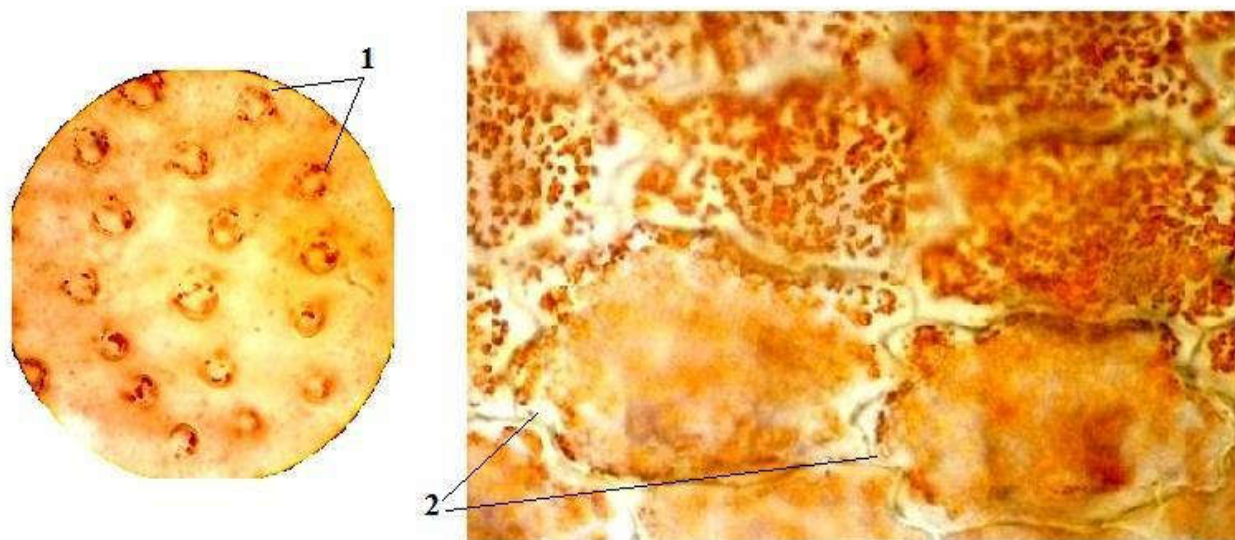


Fig. 1 - The epidermis of the abaxial side of petal of the lingual flower: 1 – papilla; 2 - cells with chromoplast

The epidermis of the adaxial side are alive too but they have thin strongly sinuous walls and have not papilla (fig. 2).

The papilla epidermis of tubular flowers have weakly sinuous walls.

Stomata apparatus (Fig. 2 B) is anomocytic types. Oblong-oval guard cells are lenticular. Stomata are located on lower side of corolla the ligulate flowers. Stomata rarely occur on the corolla surface. They are in the same plane with the epidermis.

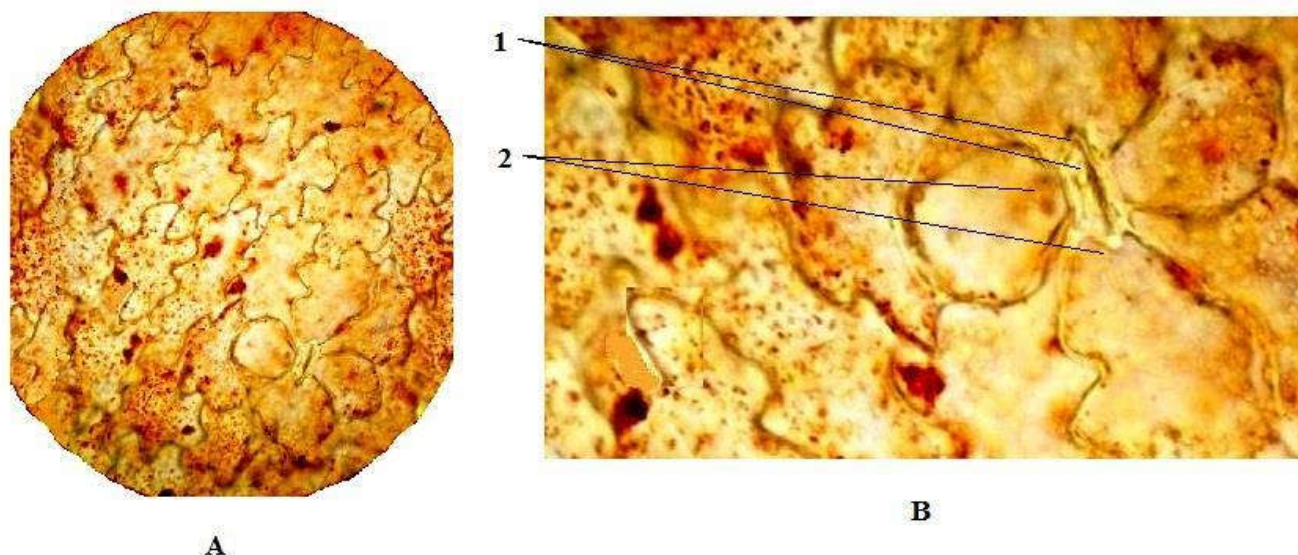


Fig. 2 - The adaxial side of petal of the lingual flower: A – epidermis; B – stomata: 1 – closing cells; 2 - cells near the stomata.

The secretory structures of ligulate and tubular flowers are presented simple glandular uniseriate trichomes that contain yellow-brown essential oil. There are secretory sinuous tubular structures with brightly orange content under the epidermis of ovary (Fig. 3).

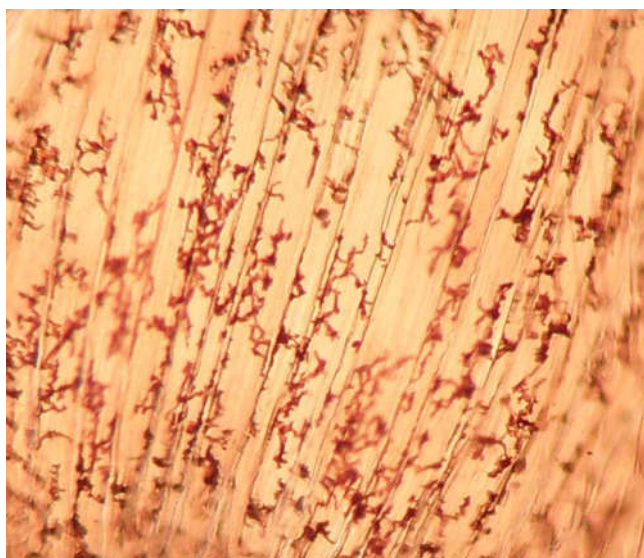


Fig. 3 - The secretory structures of flowers

The leaflets of the wrapper (Fig. 4) of the inflorescences of *Tagetes erecta plena* L. var. «Hawaji» have isolateral structure. Spongy mesophyll consists from cells which located in 3-4 layer. Epidermis cells are sinuous-angular with unevenly thickened walls. The stomata of the wrapper are few. On the surface of the leaves of the wrapper simple multicellular hairs are occasionally found (Fig. 4). Such hairs were often breaks off.

The sepals of the marigold inflorescences are reduced to membranous scales. They

have an acuminate shape and have not any pigments. Mesophyll of sepals is not developed. The cells of the epidermis are elongate with straight unevenly thickened walls. The upper and lower epidermis are closed.



Fig. 4 – The simple multicellular hairs of the wrapper

Thus as a result of microscopic analyses of herbal raw material of *Tagetes erecta plena* L. var. «Hawaji» have been established its main microscopic diagnostic signs.

Conclusion

1. A microscopic study was performed for the first time and the main diagnostic signs of herbal raw material *Tagetes erecta plena* L. var. «Hawaji» have been establish.

2. The microscopic diagnostic signs of the structure of inflorescence *Tagetes erecta plena* L. var. «Hawaji» are established. There are specific distinctions of the form of epidermis cells, stomata, secretory structures. Also are seted distinctions of structure the leaflets of the wrapper and the sepals.

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