Міністерство освіти і науки України
Ніжинський державний університет імені Миколи Гоголя, Україна
Університет кардинала Стефана Вишинського у Варшаві, Польща
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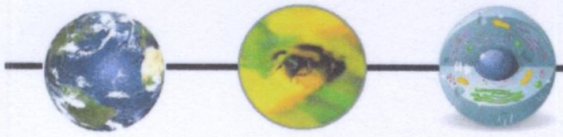
Університет імені Сулеймана Демірeля в Іспарті, Туреччина

V Міжнародна заочна науково-практична конференція

АКТУАЛЬНІ ПИТАННЯ БІОЛОГІЧНОЇ НАУКИ

Збірник статей



Ніжин
16 квітня 2019 року

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CURRENT ISSUES OF BIOLOGICAL SCIENCE

Book of articles

Nizhyn
April 16, 2019

Відповідальний за випуск: Гавій В.М.

V Міжнародна заочна науково-практична конференція "Актуальні
А43 питання біологічної науки": Збірник статей – Ніжин: НДУ імені Миколи Гоголя, 2019. – 264 с.
ISBN 978-617-527-200-8

Збірник містить матеріали V Міжнародної заочної науково-практичної конференції "Актуальні питання біологічної науки" (Ніжин, 16 квітня 2019 р.).

Видання адресоване науковцям, викладачам, учителям, аспірантам та всім, хто цікавиться проблемами сучасної біологічної науки та методикою викладання біологічних дисциплін.

У текстах матеріалів конференції, опублікованих у даному збірнику, збережено авторський стиль викладу матеріалу. За достовірність поданої інформації та можливість її відкритого друку несуть відповідальність автори.

ISBN 978-617-527-200-8

Зміст

UDC [582.929.4 + 582.794.1.144] (477.64)

[1]Pyurko O.E., [1]Velcheva L.G., [1,2]Pyurko V.E., [1]Turovtseva N.M.

Histological-functional characteristic of vegetative organs of *Mentha piperita L.* in the conditions of the Zaporozhye region

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Робота присвячена гістолого-функціональній характеристиці вегетативних органів *Mentha piperita* в умовах Запорізької області. Наведено відсоткове співвідношення тканин вегетативних органів (листка, стебла, кореня), визначена екологічна група *Mentha piperita* в залежності від вологи.

Ключові слова: *Mentha piperita*, структурно-функціональна характеристика, Запорізька область.

The article is devoted to the histological and functional characteristics of the vegetative organs of *Mentha piperita* in the conditions of the Zaporozhye region. The tissues percentage of vegetative organs (leaf, stem, root) is given, the environmental group of *Mentha piperita* is determined, depending on the moisture content.

Keywords: *Mentha piperita*, structural and functional characteristics, Zaporozhye region.

Theme actuality. In the last decade, studies on the study of medicinal plants, which are distributed on the Ukrainian territory, were renewed. *Mentha piperita* contains flavoides, dusts, carotene, ascorbic acid, nicotinic acid, resinous substances, therefore used as a prophylactic, antiseptic agent [5-10]. They did not bypass this plant and landscape designers. Every year, more and more species occupy a worthy place in gardens and parks. And on garden plots of florists-lovers more and more you can meet these interesting and amazing plants. The cut plant retains a natural coloration for a long time. These plants are used in the food industry, for the preparation of beverages, are included in the balm, as well as in the confectionery industry. Despite the fact that the *Mentha piperita* is well-studied as medicinal properties, the peculiarities of their quantitative-anatomical and functional-physiological structure are insufficiently studied, as evidenced by the lack of data in the scientific literature. Ecological and anatomical research expands the knowledge of botanists about the adaptive reactions of the organism to different environmental conditions. Anatomical indicators help systematics-botanists more objectively define the classification of certain groups of plants [1-5]. Quantitative and anatomical study of plants of various ecological groups, forms of life in recent times has some significance [11-15]. This, first of all, is due to the fact that the structure of the plant determines the

functional features of one or another body, tissue, cells, as well as the interna structure of the anatomist-ecologist, with obvious confidence, to explain hov the relevant environmental factors affect the histological features of the greer planet assimilator [16-21].

The aim of the study is to conduct a histological and functional analysis of the vegetative organs of the medicinal plant *Mentha piperita*, which is widespread in the territory of the Zaporozhye region.

The leaf is a vegetative, plastic organ of the plant, with the help of which the surface of photosynthesis, transpiration increases. Our studies have shown that the top and bottom of the mint leaves covered with the epidermis of the primary covering tissue, which is formed with protoderm. The epidermis is represented by a single layer of live, densely closed cells. The shells of the core cells are winding, which causes their strong closure. The epidermis on the adaxial side of the leaf has trichomes of two types. Single-celled elongated hair-epidermal growths that provide a reduction of transpiration. In addition to these hairs, there are glandular trichomes that emit essential oils characteristic of mint. At the section you can see glandular hairs of all ages. The hair consists of a series of living one-to-one living, thin-walled transparent cells in which protoplasm and nuclei can be seen. The ultimate cell is larger than the lower one and has a spherical shape. Essential oil is formed in this final cell and accumulates between the cellulose shell and the cuticle. When the oil accumulates a lot, the cuticle breaks out and the essential oil poured out [8-12].

Under the upper epidermis there is a palisade mesophyll, which is represented by three layers of cells. These cells are rich in chlorophyll. Between the columnar mesophyll and the lower epidermis is a spongy mesophyll with a large number of intercellular cells. Our studies have shown that the leaf of *Mentha piperita* is hypostomatic, therefore it has respiratory complexes only on the lower epidermis, glandular trychomes and single-celled cells are located only on the abacus side. The leaf is dorsiventral, since the palisade mesophyll is located only on the adaxial side. Histological analysis of the tissue of the leaf blade allows us to conclude that its structure is characteristic of xerophytes.

Unlike stems of monocotyledonous plants for the stems of grassy dicotyledons, the formation of secondary tissues, which are formed as a result of the work of cambium, is characteristic. For pepper it is characteristic of a non-oblique structure (solid cylinder with xylem and phloem with a layer of cambium between them).

Structural analysis of the stem showed (Fig. 2) division into bark, cambium, wood and core. The thickness of the layers in the upper, middle and lower parts of the stem varies. Thus, the thickness of the crust is greatest in the upper part of the stem mainly due to cells of the parenchyma of the cortex. Here the stem is covered with trychomes: glandular and unicellular. Among the cells of the parenchyma of the crust are bulging fibers in the form of strains, especially they are well developed under the edges of the stem.

Under the mechanical tissue of the cortex are sitoid tubes with the cells of the companions. Cambium lies between the bark and xylem and is represented by a single layer of elongated live cells. The wood is represented by small trachea, cells of the libriform with much thickened membranes and parenchyma cells of the core rays. Quantitative measurements have shown that the upper part of the stem of the bark is 11% of its total thickness, wood – 8%, the bulk of the stem represented by the core – 81%. The middle part of the stem of the mint consists of the same tissues as the upper one. However, their ratios vary somewhat: the bark is 17% of the total thickness, wood is 21%, the core is 53%, that is, the xylem is increased by an average of 9% (Fig. 2).

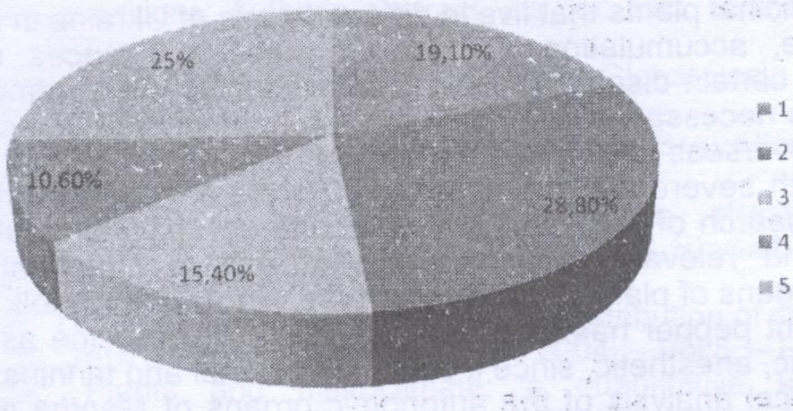

Fig.1 Anatomical leaf structure of Mentha piperita: 1 – upper epidermis, 2 – pustular mesophyll, 3 – spongy mesophyll, 4 – lower epidermis, 5 – unicellular trychomes.

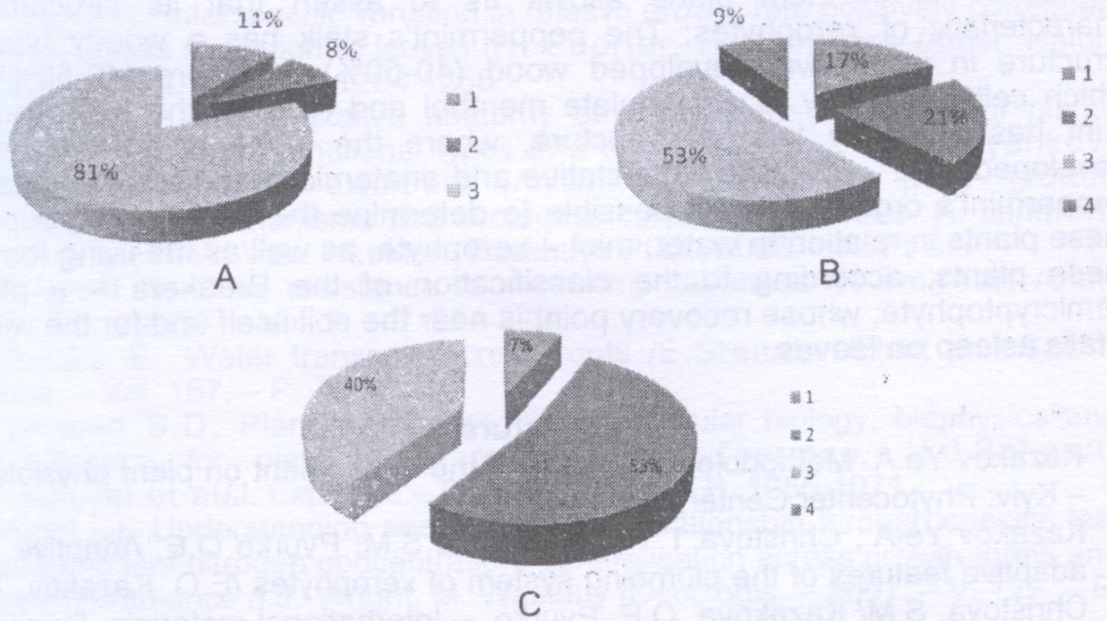

Fig.2. Inner structure of the Mentha piperita stem (%): A – upper part (1 – bark, 2 – wood, 3 – core), B – middle part (1 – bark, 2 – wood, 3 – core, 4 – xylem), B – lower part (1 – bark, 2 – wood, 3 – core).

The lower part of the stalk acquires even more xeromorphic features: so the stalk is covered with periderme, that is, the replacement of the primary tissue comes a complex of secondary tissues. The bark is 7% of the total thickness of the stem, wood – 53%, core – 40% (Fig. 2). Thus, *Mentha piperita* stem has a quadrangular shape, under the faces are located cords of bast fibers. The upper and middle parts of the stems are covered with an epidermis with trychomes on top. Histological analysis of the stem showed that it has a tree type of structure, from the upper to the lower part, increasing xenomorphic features. Our studies have shown that the main root of *Mentha piperita* has a woody type of structure, where the wood is 33-41%. *Mentha piperita* also has a well developed heart at the root – 35-38%, and other tissues occupy 21-32%.

Of particular importance are quantitative and anatomical studies for the study of medicinal plants that live in different parts of Ukraine in order to know the structure, accumulation, storage of those substances used for the treatment of certain diseases. It's no secret that for the treatment of chronic diseases it is necessary to use plants of the area where the sick people live, as various "overseas" medicines and plants, very often cause a certain group of people with severe allergic diseases. Therefore, complex anatomical and biological research of medicinal plants of different regions of Ukraine is very important and relevant. We have carried out a structural analysis of vegetative organs of plant species, which are widely used in folk and scientific medicine. Mint pepper has long been used in folk medicine as a choleretic, antispasmodic, anesthetic, since it contains menthol and tannins.

Histological analysis of the autonomic organs of *Mentha piperita* allows us to draw the following *conclusions*: the leaf is hypostomatic, therefore, the respiratory complexes are located only on the abacus side; dorsiventral – pleisane mesophyll is only on the adaxial side. The structural characteristic of the tissue of the leaf blade allows us to assert that its structure is characteristic of xerophytes; The peppermint's stalk has a woody type of structure in which well-developed wood (40-50%) and core (40-50%), in which cells are likely to accumulate menthol and tannins; the main root of mint has a woody type of structure, where the wood is 33-41%, well-developed core – 35-38%. Quantitative and anatomical studies of vegetative peppermint's organs make it possible to determine the ecological groups of these plants in relation to water: mint – xerophyte, as well as the living form of these plants, according to the classification of the Breakers – a plant-hemicryptophyte, whose recovery point is near the soil itself and for the winter it falls asleep on leaves.

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