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## Research Article

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# Comparative Morphological and Anatomical Analysis of Raw Materials of Peppermint and Field Mint

**Nagmetullaev Marat***

MD Student, Karakalpak State University, Nukus, Uzbekistan

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**Abstract:** The variety of raw materials sources of medicinal plant materials and the variety of environmental conditions in the places of their harvesting necessitates the study of indicators of the authenticity of raw materials. A comparative assessment of the external and microscopic signs of mint raw materials harvested in Uzbekistan was carried out. It has been established that the raw materials of peppermint and field mint can be distinguished by the size and pubescence of the leaf blade, the color of the corolla petals, the size and number of essential oil glands and hairs. The rest of the features are very similar.

**Keywords:** Medicinal Plant Material, Mentha Piperita, Mentha Arvensis.



## INTRODUCTION

Medicinal plant raw materials harvested in different environmental conditions and habitats enter the global pharmaceutical market. It is known that chemoraces of certain species differ in the content of biologically active substances, and, possibly, in external signs. One of the most commonly used essential oil plants in medicine and practice is mint (Mentha L.), of the Lamiaceae family, in which leaves and grass are used as official raw materials, according to pharmacopoeial articles, in different countries. In particular, peppermint leaves (Mentha piperita L.) are used in Uzbekistan (Pratov *et al.*, 2011).They are widely used.

They are used for the preparation of infusions, tinctures, are part of complex herbal preparations, therefore, it is of practical interest to study the indicators of the authenticity of these types of raw materials.

The purpose of the study is a comparative analysis of the morphological and anatomical characteristics of raw mint harvested in Uzbekistan. The objects of the study were samples of peppermint leaves, collected in Uzbekistan and samples of field mint grass, collected in Uzbekistan. An analysis of the external signs of peppermint leaf samples showed that the medicinal plant material collected by a mechanized method consisted of pieces of leaves of various shapes, 0.7–2.2 cm or more in size, with an admixture of flowers, buds and stems. The edge of the sheet is serrate with unequal sharp teeth. On the top and bottom side there were hairs. The color of the leaves was from light green to dark green, the flowers were purple. The raw material had a fragrant smell, slightly burning, cooling taste.

Hand-picked raw materials are whole, lanceolate-oblong leaves 2–8 cm in size, short-petiolate, with a petiole 0.5–1.8 cm long. The edge of the leaf is serrate with unequal sharp teeth. The surface is bare, only sparse hairs are visible from below along the veins under a magnifying glass. Sometimes the hairs occur both on the upper and lower side of the leaf blade. The color of the leaves on the underside of the leaf blade is light green, on the upper side it is dark green. The smell is fragrant. The taste is slightly burning, cooling. The analysis revealed that all samples of raw materials collected in Uzbekistan met the requirements of the State Pharmacopoeia edition XI (Rakhimova *et al.*, 2011) according to external signs and differed from each other in the size of the leaf blade and the presence of pubescence. The raw materials contained leaves with sizes of 3.8–5.7, 2–3.5 and 3.5–8 cm. Pubescence (single hairs) in most samples was on the upper and lower sides of the leaf, less often only on the lower side of the leaf. An analysis of the external signs of field mint grass samples revealed that the raw material was leafy shoots with flowers. The stems are tetrahedral with internodes 2–4 cm long, with sparse pubescence, 19–33 cm high and 0.1–0.3 cm in diameter. At the

***Corresponding Author:** Nagmetullaev Marat

break, the stem is white with a cavity inside. The color of the stems is purple. The leaves are opposite, ovate-oblong, with a pointed apex. Short-petiolate, petiole 0.4–1 cm long. The edge of the leaf is serrate-toothed. The length of the leaves is 1.2–4.3 cm, the width is 0.5–1.8 cm. The surface is bare, sparse hairs are visible along the veins under a magnifying glass. The color of the leaves on the upper side of the leaf blade is green, on the lower side - light green. The flowers are white, in the axils of the leaves. The smell is strong, fragrant. The taste is cold, slightly pungent. The analysis made it possible to establish that the samples of raw materials collected in Uzbekistan met the requirements of the State Pharmacopoeia of Uzbekistan in appearance and practically did not differ from each other, except for the height of the stem (21–33, 19–29 cm) and the dimensions of the leaf blade (length 2.7–4.3 and 1.2–3 cm, width 1.6–1.8 and 0.5–1.5 cm). External signs of samples of raw materials of peppermint and field mint had certain similarities and differences. Peppermint leaves, unlike field mint, are larger, more pubescent, hairs are more visible. The stalks of field mint are hollow, unlike the stalks peppermint. Flowers of field mint and peppermint differed in location and color.

The analysis of the anatomical structure was carried out in accordance with the instructions of the article “Technique for microscopic and microchemical studies of medicinal plant materials” (Taxtadjyan, 1987) and the pharmacopoeial requirements of private articles (Pratov *et al.*, 2011; & Rakhimova *et al.*, 2011). When examining the upper and lower sides of a peppermint leaf, epidermal cells with sinuous walls were visible. Stomata with two peristomatal cells 20.8–29.2 µm in size, located perpendicular to the longitudinal axis of the stoma (diacytic type). Simple 2–6-celled hairs with a warty cuticle 50–520.9 µm in size were observed over the entire surface of the leaf; small capitate hairs 25–33.3 µm in size, consisting of a short unicellular stalk and a unicellular obovate head. On both sides of the leaf, there were essential oil glands 65.6–83.3 µm in size with a short stalk and a rounded head consisting of 6–8 radially arranged cells (Samylina & Anosova, 2007). In a field of view of 1 mm², from 6 to 37 glands were observed. The analysis performed showed that the anatomical features of peppermint leaves met the requirements of the State Pharmacopoeia XI (Taxtadjyan, 1987). The studied samples had practically no differences. When examining a leaf of field mint from the lower and upper surfaces, epidermal cells with strongly sinuous walls were visible, stomata with two near-stomatal cells located perpendicular to the longitudinal axis of the stoma (diacite type), 24.6–32.8 µm in size. Along the veins are sparse simple 2–4-cell simple hairs 100–375 µm in size. On the entire surface there were small capitate hairs, consisting of a short unicellular stalk and a unicellular obovate head, 26.6–33.3 µm in size. On both sides of the leaf, essential oil glands 49.2–66.7 µm in size were noted, which had a short stalk and a round head, consisting of 4–8 radially arranged excretory cells. In a field of view of 1 mm², from 5 to 66 glands were observed.

It was found that the anatomical features of field mint leaves met the requirements of the State Pharmacopoeia of Vietnam and practically did not differ from each other (Pratov *et al.*, 2011). A comparative analysis of microscopic features showed that the studied samples of peppermint and field mint had both similarities and some differences. In peppermint leaves, in contrast to field mint, simple hairs were much more common.

In the leaves of field mint, simple hairs were found only along the veins, while in peppermint they can be found over the entire surface of the leaf. Peppermint has large essential oil glands, with a high content of essential oil.

A comparative analysis of the morphological and anatomical characteristics of the raw materials of peppermint, collected in the Uzbekitan, and field mint, showed that the leaves differ slightly from each other in terms of external features. In microscopic analysis, the differences are more pronounced. Therefore, in order to distinguish between these types of raw materials, it is advisable to use a microscopic method for examining leaves.

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