Petiole (Fig. 4b, e).

Petiole is a shallow arc-shaped (*Nepeta cataria* L.) or arc-shaped (*Melissa officinalis* L.) with 2 wings. The epidermal cells are squarish and nearly rectangular with thin cuticle. The number of angular collenchyma layers are present in each wing and adjoining the single layer epidermal cell in the large vascular bundle region. Vascular bundle in conjoint is collateral, one large arc-shaped is present in center and smaller, circular bundles in each wing which surrounded by the large, irregular parenchyma cells. The parenchyma cell is larger in *Melissa officinalis* L. than those of *Nepeta cataria* L.. The distribution of associated sclerenchyma varies in different both the plants: sclerenchyma patches (*Nepeta cataria* L.) or layers (*Melissa officinalis* L.) adjoin to a phloem part. The phloem is slightly compressed (*Nepeta cataria* L.) or compressed (*Melissa officinalis* L.). Cambium is absent.

Leaf (Fig. 4c, f).

Leaf: dorsiventral. The epidermis consists of a single layer of uniseriate oval or rectangular cells which is covered by thin cuticles. Beneath epidermis, elongated palisade cells with chlorophyll and isodiametric spongy parenchymatic cells with intercellular spaces.

In the midrib region presents no differences with regard to petiole: leaf with a single large vascular bundle in the center presents a convexity on the abaxial side and a concavity on the adaxial side, the angular collenchyma layers are present adjoining the upper and lower epidermis. Sclerenchyma cells or layers adjoin to a phloem. The phloem is slightly compressed (*Nepeta cataria* L.) or compressed (*Melissa officinalis* L.). Cambium is absent.

Significant differences occur concerning the number and the distribution of vascular bundles, chlorenchyma, collenchyma, sclerenchyma, palisade layers of cells; intercellular spaces of spongy parenchyma and phloem properties. The main different characters are observed and shown in Table 3.

Anatomical results demonstrated the differences in the epidermis in surface view of stem, petiole, leaf, calyx, corolla and in cross-section of stem, petiole, leaf. In the epidermis in surface view were found to be anatomically different, especially in regard to epidermal cell anticlinal walls; epidermal cell of calyx and corolla; types of trichomes. In cross-section, the number and the distribution of vascular bundles, chlorenchyma, collenchyma, sclerenchyma, palisade layers of cells; intercellular spaces of spongy parenchyma and phloem properties are distinctive anatomical features in both studied plants.

CONCLUSION

Investigations into the vegetative morphology and anatomy of two herbal drugs *Nepeta cataria* L. and *Melissa officinalis* L. was carried out. Identification key based on the characters of morphological features, anatomical features of the epidermis in surface view and cross-section is described.

In this paper, we report the results of a morphological and anatomical study of *Nepeta cataria* L. so as to improve the present knowledge for identification purposes and might be further used in the development of regulatory documents on this type of herbal medicinal raw materials.

REFERENCES

[1] Adiguzel A. et al., Antimicrobial and antioxidant activity of the essential oil and methanol extract of Nepeta cataria. *Pol J Microbiol*, 2009, *58* (1), 69-76.

[2] Barykina, R.P. et al., Spravochnik po botanicheskoi mikrotekhnike. Osnovy i metody (*Handbook for Botanic Microtechnique. Basics and Methods*), Moscow: Mosk. Gos. Univ., 2004.

[3] Dashek W.V., Methods in Plant Electron Microscopy and Cytochemistry , *N.Y. Humana Press*, 2000.

[4] Duda S.C. et al., Changes in major bioactive compounds with antioxidant activity of Agastache foeniculum, Lavandula angustifolia, Melissa officinalis and Nepeta cataria: Effect of harvest time and plant species, *Industrial Crops and Products*, 2015, *77*, 499-507.

[5] Paliy I.N., Fiziologicheskie osobennosti Agastache foeniculum Pursh. i Nepeta cataria var. citriodora Veck. v usloviyah yuzhnogo berega Kryima: dissertatsiya ... kandidata biologicheskih nauk: 03.01.05. (Physiological characteristics of Agastache foeniculum Pursh. и Nepeta cataria var. citriodora Beck. in conditions of southern coast of Crimea: dissertation ... of candidate of biological Sciences).Voronezh. Gos. Univ., Yalta, 2015. 181 p.

[6] Prescott T.A.K. et al.. Direct inhibition of calcineurin by caffeoyl phenylethanoid glycosides from Teucrium chamaedrys and Nepeta cataria. *Journal of ethnopharmacology*. 2011. *137* (3), 1306-1310.

[7] State Pharmacopoeia of the XIII edition, Moscow: Medicine, 2016. (http://femb.ru/feml)

[8] Tzakou, O. et al.. Essential oil composition of Nepeta argolica Bory et Chaub. subsp. argolica. *Flavour and Fragrance Journal*. 2000. *15*, 115–118.