Morphological and Anatomical Study of Two Medicinal Plants from Genus Mentha

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ABSTRACT

Labiatae family contains many genera and species, fast majority have economical values due to their use as medicinal plants. Large number of its genera considered as a source of active substances especially essential oils. Among these is genus Mentha from which we choose two species, Mentha spicata and Mentha pulegium to carry out morphological and anatomical studies. Our study shows similarities and differences between the two species. They are both herbal plants and have squared forms of crosssections of stems, with differences in their inflorescences. However, M. pulegium has a particular feature which is the presence of lacunar parenchyma tissues in all sections. Trichomes were present on the epidermis of stems and leaves and they are unicellular or multicellular which form either glandular or protective cells. Their difference in number and form is clear between the two species as well as their differences in different parts depending on the age of the plant.

Key words: Labiatae family, morphological and anatomical studies, Mentha spicata, Mentha pulegium.

Introduction

Labiatae family contains around 250 genera and 7000 species and subspecies [2]. This family is divided into eight sub-families: Ajugoidae, Chloranthoideae, Lamioideae, Pogostemonoideae, Scutelarioideae, Teucrioideae, Viticoideae and Nepetoidae to which Mentha genus belongs (Tucker et al., 2006). Labiatae are well known for the essential oils common to many members of the family. The purpose, members of this family are used for is different however, the main use can be medicinal, ornamental and aromatic plants.

Two species (Mentha spicata and Mentha pulegium) of genus mentha were chosen to carry out morphological and anatomical studies. They are well spread in Algeria mainly in moist to wet grounds and most used as medicinal plants.

Materials and Methods

1- Plant Materials:

Aerial parts were collected during flowering period at the end of June 2008 from Amoucha region of Setif at an altitude of 800 m. Samples were identified at plant biology laboratory, department of biology university of Setif and air-dried at room temperature in the shade.

2- Preparation of Sections for Anatomical Study:

Young fresh parts containing roots, stems and leaves were chosen and sections were taken manually using sambucus wood, sharp riser blade and double colouration according to Locquin et Langeron [4] method.

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Results:

1- Plant Morphology:

Mentha spicata: A perennial herb with erect square stems and green opposite short stalked and toothed margins leaves.

Flowers are borne in whorls in dense terminal spike with a tubular calyx and pale violet bell-shaped (conical) corolla. Length of the plant is between 15 to 50 cm tall and can reach 90 cm. Flowering period is between June and September. This species is widely cultivated as well as grown naturally.

Mentha Pulegium:

A perennial aromatic herb with a 4 angles stem and small green long-stalked leaves. Flowers are borne in whorls in dense spikes in the axils of the leaves with tubular calyx which have five unequal sepals and bell-shaped (conical) corolla. The plant is 10 to 45 cm high and grows in moist damp streams. Flowering period is between June and July.

Experiments carried out to cultivate these two species using stems show a positive results with high yield compared to those cultivated using seeds. In addition results were much better when seeds or stems are used then when plants are grown naturally.

Anatomical Study:

The anatomical studies that are carried out on young fresh stems, roots, and leaves of both species show similarities and differences between them. Pith, xylem, phloem cortex and epidermis are found in stem, in addition to angular collenchyma tissue in cortex cells. However, collenchyma tissue is more or less uniformly spread out in four corners of the stem in Mentha spicata, unlike in Mentha pulegium where it is spread out all over the stem. Cortex in Mentha pulegium is wide and this is due to lacunous parenchyma tissue being present. Both species have erect square stems.

Leaves were thicker in Mentha pulegium with less deep venation and lacunous parenchyma surrounding vascular tissues. Both species contain glandular and covering trichomes.

Observations show two types of secretive glands with short stalks. The first with unicellular globule head and the second is a multicellular oval head. The presence of these types of glands are dense in Mentha spicata. Covering trichomes are simple and more dense in Mentha pulegium with no more then two cells, but in Mentha spicata the number of cells forming these trichomes is between 5 and 8 cells. Epidermis layer in both species have stomata joined with subsidiary cells to form stomatal complex.

Cross sections of roots in the two species are similar in terms of number of tissue zones (epidermis, cortex, vascular tissues and pith), number of vascular tissues and general form.

The most important feature is lacunary parenchyma which is present in Mentha pulegium. The presence of lacuna tissues in Mentha pulegium is due to the fact that plants leave in waterlogged soil or partly submerged in water.

This is supported by Gorenflot [1] who mentioned that aquatic (hydrophyte) plants have this characteristic feature.

Boughdiri [8] mentioned the presence of external secretory structures such as glandular hairs mainly in labiatae family to which mentha belongs. In a study carried out by Spencer et al [5] on Mentha citrata found that these plants contain glandular trichomes which have short stalks and unicellular globule heads.

Zizofic et al [7] emphasized that species of labiatae family like Basilic, Rosmarin, Origan, Lavende…….. have on the surface of their leaves two types of glandular hairs.

Karray Bouraoui [3] studied the effect of salinity on the production of essential oils in Mentha pulegium grown under natural condition. She found that leaves and stems contain simple covering hairs of 3 cells and two types of glandular hairs, one is small of 2 cells which make stalk and head and the other one is gland oval of 10 cells covered with large cuticle. Also she mentioned the number of glandular cells in glandular hairs diver from one species to another according to stages of growth.

The number in mature leaves was: in Mentha pulegium is 10 cells, in Mentha spicata is 12 cells and in Mentha piperita is 8 cells. In addition density of these glandular hairs is different depending on the age of the plant.
References