

Petiole anatomy Study of some medicinal species of *Salvia* L. in Iran

Gholamreza Bagheri, Seyed Mohammad Mousavi* and Seyed Ali Mousavi

Zabol University of Medical Sciences, Zabol, Iran
Corresponding Email: smm9080@yahoo.com

ABSTRACT

In this study, the petiole anatomy of six species of *Salvia* the family Lamiaceae named *Salvia staminia*, *S. limbata*, *S. viridis*, *S. multicalis*, *S. bractata*, *S. palastinia* Discussed and compared. Considered samples were cutting and colored. The results showed that almost all species differences in terms of overall shape, shape and number of vascular bundles, trichomes type, number and shape of the epidermis, Collenchyma, parenchyma showed. None of the petioles have n' t peltate glandular trichomes. The highest number of Vascular bundles in the petiole *S.limbata* were observed. The most prominent square shape of petiole in *S. Stamina* and *S. palastinia* were reported The highest number of the parenchyma layers in species *S. palestinia* were observed.

Keywords: Anatomy, *Salvia* L, vascular bundles, peltate glandular trichomes, petiole

INTRODUCTION

Mint herbs (Lamiaceae) are has widely distributed in Iran. *Salvia* is one of the most important and most valuable medicinal in mint family in Iran. Name of the plant *Salvia* is derived from the Salvare Latin word which means healer. Many species of *Salvia* commonly referred to as food, medicine and as a cosmetic used [1,2]. *Salvia* species have been shown to have antibacterial, antifungal, anti-tumor and anti-inflammatory. In addition, it is widely in perfumes has been used. In traditional medicine is used to treat colds. [3-6]. *Salvia* leaves due to essential oils, invigorating effect and due to the presence of tannins, is tonic. Also laxative, anti-seizure, febrifuge and is also a diuretic [6]. *Salvia* essential oil used for the disinfection and another is the use tea [1].

Akcin and colleagues Petiole anatomy and some Lamiaceae Taxa assessed [7]. Burcu and colleagues leaf anatomy taxons *Salvia nemorosa* subsp. tesqui cola, *Salvia nutans*, and *Salvia* × *Sobrogensis* Were examined [8]. Vaezi and Colleagues petioles and stems of some species of *Salvia* anatomy in the iran North East [9]. Aktas and colleagues examined the characteristics of the morphology and anatomy of *Salvia tchihatcheffii* [10]. Since the identification of *Salvia* are very similar to each other only in terms of morphology not an easy task. That's why anatomical investigation can meet the needs of botanists to identify better and faster species close together.

MATERIALS AND METHODS

Related species from different regions of Iran were collected (Table 1). After identification, petiole isolated and then slice very thin decisions were taken. In summary, the anatomy stages was as follows: The samples were bleached by sodium hypochlorite and were stained with methyl green and Zaji Carmen colors. After each step, the samples were rinsed with distilled water. Samples were prepared by a microscope, assessed and then photographed.

Table 1. The localities of studied *Salvia* species

	Species	Locality		Species	Locality
1	<i>S. stamina</i>	firuzkuh: zeraatkar	2	<i>S. limbata</i>	alburz: zeraatkar
3	<i>S. viridis</i>	rudbar: zeraatkar	4	<i>S. multicalis</i>	Mazandaran:zeraatkar
5	<i>S. bractata</i>	Ilam: zeraatkar	6	<i>S. palastinia</i>	marvdasht, saddedorudzan:zeraatkar

RESULTS

Petiole anatomy study

Salvia staminea

The overall shape square with two appendages and depressed upper surface, surrounded by a layer of the oval epidermis. 2 Collenchymalayer, 10 parenchyma layer after layer of the lower epidermis polygon, 5 vascular bundle in the center and two small handles located in the upper part of petiole (A).

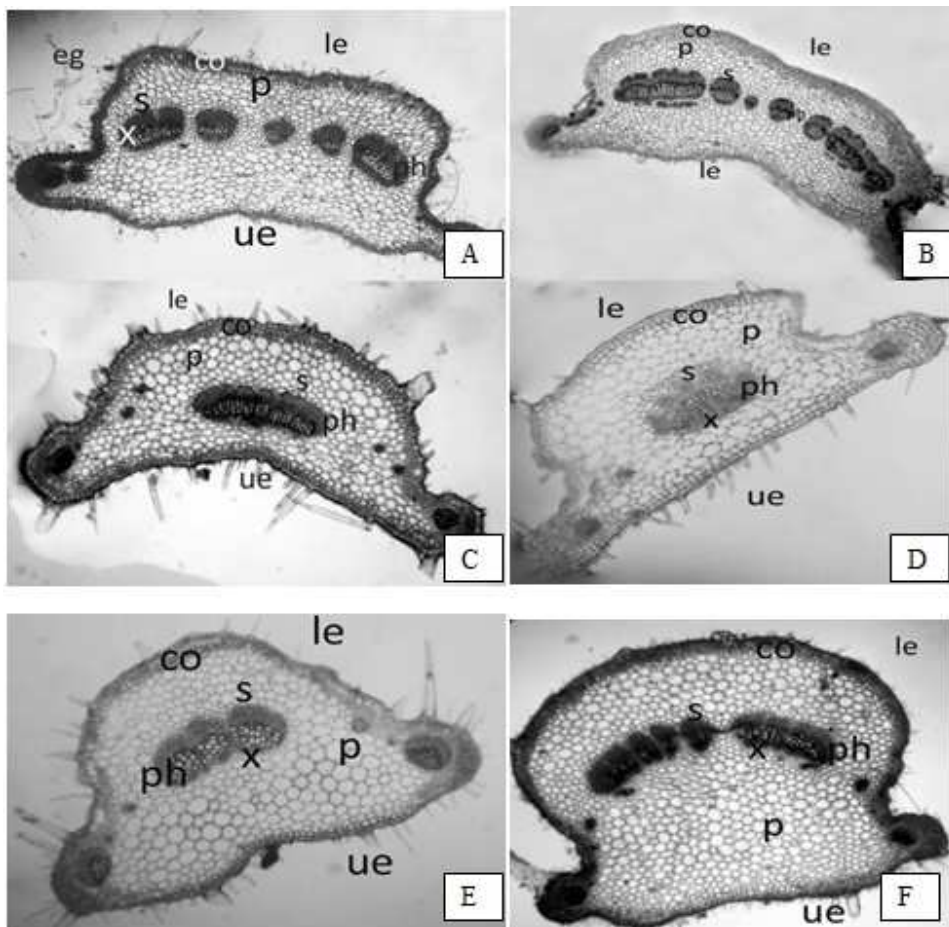


Fig. 1: petiole anatomy of *Salvia staminea*(A), *S. limbata*(B), *S. viridis*(C), *S. multicalis*(D), *S. bractata*(E), *S. palastinia*(F). (× 40, 100)
 Ue: upper epidermis; Le: lower epidermis; Co: collenchyma; P: parenchyma; S: sclerenchyma; X: xylem; Ph: phloem; e:epidermis; p: parenchyma; Pr: pith parenchyma

S. limbata

the overall shape square with two lateral appendages and depressed upper surface, surrounded by a layer of the square shape epidermis. 4Collenchymalayer, 12polygonalparenchyma layer after layer of the lower epidermis, 7 vascular bundles in the center and 2 small bundles located in the upper part of petiole (B).

S. viridis

The overall shape Semicircular with two lateral appendages and v shape upper surface, surrounded by a layer of the square shape epidermis. 4Collenchymalayer, 12 polygonal parenchyma layer after layer of the lower epidermis, 5 vascular bundles in the center and 2 small bundles located in the upper part of petiole (C).

S. multicalis

The overall shape Semicircular, The two sides are depressed, surrounded by a layer of the square shape epidermis. 2Collenchymalayer, 12 polygonal parenchyma layer after layer of the lower epidermis, 1 vascular bundles in the center and 4 small bundles located in the upper part of petiole (D).

S. bractata

The overall shape semicircular and trilateral surrounded by a layer of the square shape epidermis. 1Collenchyma layer, 12 polygonal parenchyma layer after layer of the lower epidermis, 3 vascular bundles in the center and 2 small bundles located in the upper part of petiole (E).

S. palastinia

The Stretched square petioles, surrounded by a layer of the triangular shape epidermis.3Collenchymalayer, 14-16 polygonal parenchyma layer after layer of the lower epidermis, 5 vascular bundles in the center and 4 small bundles located in the upper part of petiole (F).

Table2: Comparison of trichomes in the surface of *Salvia*

Species		Non-glandular trichomes	Capitate glandular trichomes	peltate glandular trichomes
1	<i>Salvia staminia</i>	+	-	-
2	<i>S.limbata</i>	+	+	-
3	<i>S.viridis</i>	+	-	-
4	<i>S.multicalis</i>	+	-	-
5	<i>S.bractata</i>	+	+	-
6	<i>S.palastinia</i>	+	-	-

DISCUSSION

Examine the differences and similarities in species and their identify, petiole anatomy of seven species of *Salvia* in Iran was conducted, Petiole all species have been non- glandular trichomes, and the species *S.limbata*, *S.bracteata* has a Capitateglandular trichomes (Table2). And none of the petioles were not Peltate glandular trichomes. The greatest number of Vascular bundle in the petiole *S.limbata* observed. Dominant and obvious of petioles the in species *S. stamina*, and *S.palastinia* square form were reported. shape of parenchyma cells in all species was seen as a polygon. The greatest number of parenchyma layers in the species *S.palastinia* were observed. (Fig. 1).Baran and Ozdemirin 2006 determined that the *Salvia napifolia* petiole generally elliptical in square shape, rectangular epidermal cells, 2-5 Collenchyma and 11-15 parenchyma layer observed [11].

Akcin and colleagues in 2011 in the reviews *Salvia* species determined that the epidermis of petiole in species of *Salvia verbenaca*, *S.viridis* and *S. virgata* has a unicellular and multicellular non- glandular trichomes and lack Peltete glandular trichomes [7]. Burcu and colleagues reported that the petiole in *C.nutans* has peltate glandular trichomes and many glandular trichomes [8]. Vaezi and colleagues determined that the petiole in *S.ceratophylla* and *S.virgata* with 2 and 12 Collenchyma layers respectively [9]. Aktas and colleagues reported that more trichomes on the petiole in species of *Salvia tchihatcheffii* is glandular type, with 6-12 layers of parenchyma, and epidermal cells is usually ovoidal [10].

CONCLUSION

It can be concluded from this study that there are differences in anatomy forms petioles among species of *Salvia*. As well as the type of existing trichome, can be somewhat good example for distinguishing species.

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