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ANATOMY AND PALYNOLOGY OF ENDEMIC *STACHYS IBERICA* BIEB. SUBSP. *IBERICA* VAR. *DENSIPILOSA* BHATTACHARJEE (LAMIACEAE) FROM TURKEY

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Abstract

Detailed anatomical characteristics and pollen structure of the Turkish taxon *Stachys iberica* Bieb. subsp. *iberica* var. *densipilosa* Bhattacharjee are reported. The plant has a compact root anatomy with a full xylem component in pith and demonstrated a typical four-cornered stem with three to four layers of the collenchyma cells inside the epidermis. In the leaf mesophyll, the palisade and spongy parenchyma cells are of a similar shape. The leaf is amphistomatious with amaryllis, mesomorphic and anisocytic type of stomata. Pollens were suboblata-subprolata and tricolpatae. Exine ornamentation was tectatae-reticulatae type.

Introduction

The *Stachys* is one of the largest genera of family Lamiaceae consisting of more than 270 species in the world where 101 taxa occur in Turkey (Davis 1982-1988). *Stachys* species are found in mild regions of the Mediterranean and in south-west Asia. Of the 101 *Stachys* species reported in the Flora of Turkey, 72 are described, and of these 29 are endemic. The rate of endemism for the *Stachys* genus is 40% (Uysal 2002).

The plant is known in Anatolia as Adacayi and Dag cayi, and is used as sage and as popular medicines to treat genital tumours, sclerosis of the spleen, inflammatory tumours, coughs and ulcers. Tea prepared from the whole plant or leaves are used in phytotherapy, possessing sedative, antispasmodic, diuretic and emmenagogue activities (Yesilada *et al*. 1999). In addition, extracts or parts of the plant exert various pharmacological effects such as, anti-inflammatory (Khanavi *et al*. 2005), antimicrobial (Petrovic *et al*. 2006), antibacterial (Grujic-Jovanovic *et al*. 2004), anxiolitik (Rabbani *et al*. 2003, 2005) and antioxidant (Coudalis *et al*. 2003, Erdemoglu *et al*. 2006).

Davis (1982-1988) conducted a systematic study on the species of *Stachys* in Turkey but limited anatomical studies only by Uysal (1998, 2002). No study on the pollen morphology of the *Stachys* species occurring in Turkey has been encountered in the literature. The anatomical characteristics and detailed pollen morphology of endemic *Stachys iberica* Bieb. subsp. *iberica* var. *densipilosa* Bhattacharjee, was investigated in order to throw more light on evolutionary and systematic relationships.

Materials and Methods

Stachys iberica Bieb. subsp. *iberica* var. *densipilosa* Bhattacharjee plants were collected from Geyve (Sakarya), herbarium samples were prepared and deposited in the Eskisehir Osmangazi University Herbarium (OUFE 12913, O. Koyuncu, A3 Sakarya: Geyve, Maksudiye Köyü, road sides, 21.07.2004, 40°35′45.0′′ N, 30°22′54.5′′ E, 460 m). Roots, stems and leaves were fixed in

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70% alcohol for anatomical study through cross-sections (by hand). All the sections were stained with Sartur (60 ml lactic acid, 45 ml Sudan III (Merck), 2 g aniline, 0.2 g I, 1 g KI, 10 ml alcohol (95 %), 80 ml distilled water) and made permanent by glycerine gelatine. A number of anatomical books and reviews were consulted (Metcalfe and Chalk 1950, Esau 1967, Fahn 1967, Ozorgucu *et al*. 1991, Ozorgucu 1993, Yentur 1995, Uysal 1998, 2002).

The pollen samples obtained from the herbarium specimens were studied using light microscope following Faegri and Iversen's terminology for the exine layers (Wodehouse 1935, Erdtman 1969). Pollen identification and counts were made by Prior binocular microscope. A minimum of 20 and a maximum of 50 replicates were studied. Photomicrographs were taken by Spot In-SIGHT Color Digital camera and an Olympus type microscope. Palynological books were consulted for the identification of pollens (Wodehouse 1935, Pokrovskaia 1958, Erdtman 1969, Aytug *et al*. 1971, Faegri and Iversen 1975, Pehlivan 1995).

Results and Discussion

The roots have a periderm layer followed by parenchymatous cortex (Fig. 1A). Phloem occupies a narrow area with two to three layers of cells. Cambium cells are distinguishable. Pith region is narrow because of xylem that occupies much of the pith region.

Stem is typically four-cornered and possesses a thick cuticle with small-celled epidermis (Fig. 1B). Cortex is five to six-layered and parenchymatous. There is a five to six-layered collenchyma tissue. Dense collenchyma cells located at the corners of the stem is a distinguishing anatomical characteristic of the Lamiaceae. There is a sclerenchymatous sheath on the phloem tissue which occupies a small region. Cambium is not distinguishable and the pith region is large and parencymatous.

In leaves the upper epidermis consists of flat-ovoidal cells and the lower epidermis is made up of cells having same length and breadth (Fig. 1C). Stoma cells are present in both the epidermis. Palisade parenchyma cells are two-layered. The leaf is amphistomatic. The plant has an amaryllis, a mesomorphic and anisocytic type of stomata on both surfaces of the leaf. In the leaf anatomy, epidermal cells of different sizes can be observed with larger epidermal cells occurring on the underside. The leaves are equifacial.

Pollens are suboblata-subprolata, tricolpatae P/E = 0.89 non-acetolysed (N), 0.88 acetolysed (A). Ornamentation is tectatae-reticulatae. Exine 1.58 µ (N), 1.48 µ (A), Tectum reticule (Fig. 1 D-G, Table 1).

Table 1. Mean values (µm) of pollen morphometrical parameters of *S. iberica* subsp. *iberica* var. *densipilosa* having non-cetolysed pollen (N) and acetolysed pollen (A). n = 20/50.

Type	P		E		P/E	L		clg	
	R	M	R	M		R	M	R	M
N	31 - 21	25.50 ± 0.68	34 - 22	28.45 ± 0.64	0.89	36 - 25	29.16 ± 0.33	19 - 13	15.00 ± 0.60
A	27 - 20	22.55 ± 0.40	30 - 20	25.55 ± 0.59	0.88	33 - 24	27.20 ± 0.32	12 - 10	11.28 ± 0.28

Contd.

Type	clt		t		Exine		intine	
	R	M	R	M	R	M	R	M
N	9 - 5	7.22 ± 0.46	20 - 10	15.56 ± 0.28	2 - 1.00	1.58 ± 0.04	1 - 0.25	0.59 ± 0.03
A	5 - 1	2.57 ± 0.48	18 - 9	13.52 ± 0.28	2 - 0.75	1.48 ± 0.05	-	-

P, polar axis; E, equatorial axis; L, equatorial countour diameter; t, apocolpium; clg, length of the colpus; clt, width of the colpus; M, mean; R, range.

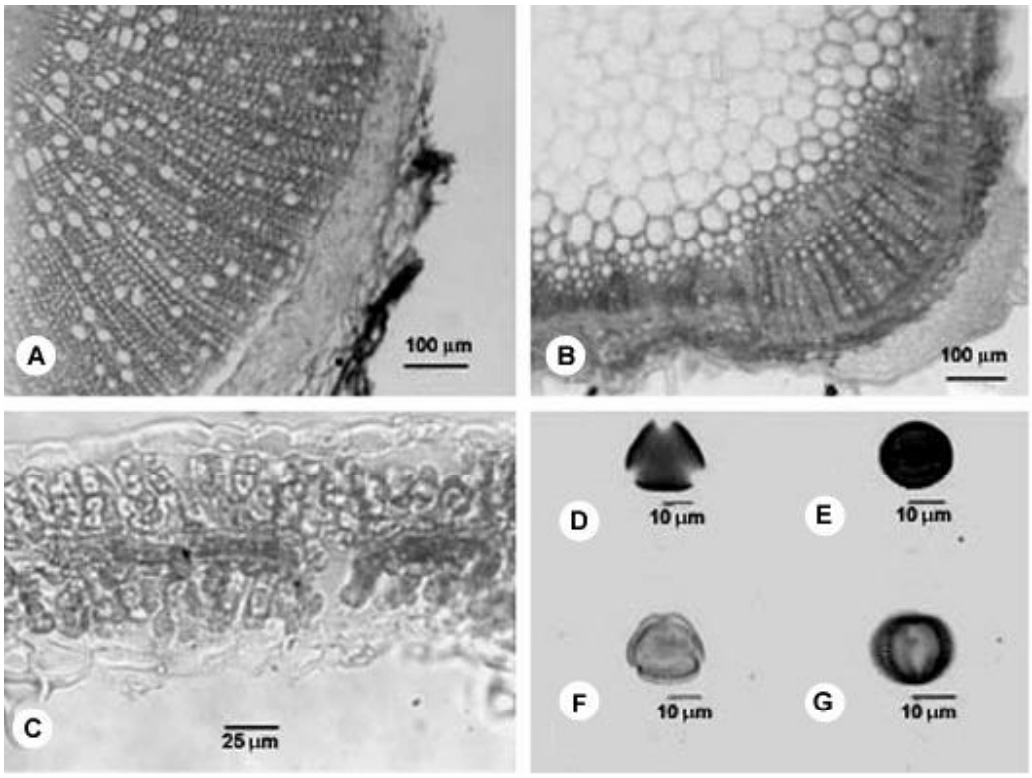

Fig. 1A-G. Anatomy and pollen morphology of *S. iberica* subsp. *iberica* var. *densipilosa*: A. Cross-section of the upper part of a root. B. Cross-section of the stem. C. Cross-section of leaf. D. Polar view of a non-acetolysed pollen. E. Equatorial view of a non-acetolysed pollen. F. Polar view of an acetolysed pollen. G. Equatorial view of an acetolysed pollen.

It was observed from the composition of the cortex structure and periderm transverse sections of the upper part of a root that secondary growth is a result of the plant's long-existence (Metcalfe and Chalk 1950, Esau 1967, Fahn 1967, Ozorgucu *et al*. 1991, Ozorgucu 1993, Yentur 1995, Uysal 1998, 2002). The plant is benefited in terms of protection, durability, and resistance against external effects from the ring-shaped vascular bundles of the surrounding sclerenchyma (Ozorgucu *et al.* 1991). The similar characterizations were observed in the root anatomy of *Stachys cretica* L. subsp. *smyrnaea* Rech Fil. and *S. thirkei* (Uysal 1998, 2002). The character of the xylem element along with their fullness, make up the lignified cell wall. This can be seen particularly in *Stachys cretica* L. subsp. *smyrnaea* and *S. thirke*. The typically four-cornered stem-type with dense collenchymatic cell walls located in the corners is a distinguishing character of the Lamiaceae family (Metcalfe and Chalk 1950). Below the epidermis there are five to six cortex cell layers. After the cortex, a layer of bulk cells and ring shaped starch sheath are situated. The starch sheath of roots constructs a homologue of endodermis and encompasses the surrounding vascular system like a belt (Fahn 1967, Ozorgucu 1993). Beneath the starch sheath, schlerechymatic cell clusters can be seen in patches. Hardly any selective phloem can be found between the schlerechymatic cell clusters and the xylem. Xylem has trache, tracheids, and the parenchyma and between these, there are scattered sclerenchyma clusters. Here in the sclerenchyma, support against external effects to the stem is supplied. The pith, covering a wide area, is composed of

parenchymatic cells also observed in the stems of *Stachys cretica* L. subsp. *smyrnaea* and *S. thirkei* (Uysal 1998, 2002). In the leaf anatomy, there is an external dense cuticle, and on the underside of this is a layer of epidermis. The dense cuticle of the epidermis is positioned alongside the plant's water loss management and this condition is a characteristic of xerophytic plants (Yentur 1995). Epidermis cells can be observed at different sizes with larger epidermis cells occurring on the underside. The contour of the palisade and spongy parenchyma cells cannot easily be distinguished in the mesophyll tissue. The leaves are equifacial. The leaf has been reported as bifacial in *Stachys cretica* L. subsp. *smyrnaea* and *Stachys thirkei* (Uysal 1998, 2002). There are amaryllis and anisosytic type stomata on both surfaces of the leaf. Thus, the leaf is amphystomatic. In the transportation bunch of the central vein, two cell layers occur on the outside of the phloem, and the interior of the xylem, covers a wider space. One to two layers of schlerencyma cells can be seen in the xylem, as well as under the parencymatic cells. Vascular tissue analized by the parencymatic cells. In this state, the leaves of *Stachys cretica* L. subsp. *smyrnaea* and *Stachys thirke* showed parallelness (Uysal 1998, 2002).

The results of the light microscope investigation revealed the suboblata-subprolatae and tricolpatae pollens (Figs D-G). The exine is tectatae-reticulatae. The essential criteria for the determination of the phylogenetic relationship of the aperture and exine function of this species has been reported in the literature (Kuprianova 1967, Cronquist 1968, Walker 1974a,b, Takhtajan 1980). It has been observed that determined genetic distinctions encompassed differences in the measurements determined, raising objections to the possession of a morphological characteristic passing to the pollen structure of this species (Cronquist 1968).

References

Aytug B, S Aykut, N Merev and G Edis 1971. İstanbul Çevresi Bitkilerinin Polen Atlası. İ. Ü. Yayın No:1650. O. F. Yayın No: 174.

Cronquist A 1968. The evolution and classification of the flowering plants. Thomas Nelson, Edinburgh.

Couladis M, O Tzakou, E Verykokidou and C Harvala 2003. Screening of some Greek aromatic plants for antioxidant activity. Phytotheraphy Res. **17**: 194-195.

Davis PH 1982-1988. Flora of Turkey and The East Aegean Islands. Vol. **7, 10**, Edinburgh Univ. Press. Edinburgh.

Erdemoglu N, NN Turan I Cakıcı, B Sener and A Aydın 2006. Antioxidant activities of some Lamiaceae plant extracts. Phytotheraphy Res. **20**: 9-13.

Erdtman G 1969. Handbook of palynology, morphology, taxonomy and ecology. An Introduction to the study of pollen grains and spores. Hafner Pub., New York.

Esau K 1967. Plant Anatomy. John Willey, New York.

Faegri K and J Iversen 1975. Textbook of pollen analysis. 3rd edition. Munksgaard, Copenhagen.

Fahn A 1967. Plant Anatomy. Pergamon Press, New York.

Grujic-Jovanovic S, HD Skaltsa, P Marin and P Sokovic 2004. Composition and antibacterial activity of six *Stachys* species from Serbia. Flavour Fragrance J. **19**: 139-144.

Khanavi M, M Sharifzadeh, A Hadjiakhoondi and A Shafiee 2005. Phytochemical investigation and anti-inflammatory activity of aerial parts of *Stachys byzanthina* C. Koch. J. Ethnopharm. **97**: 463-468.

Kuprianova A 1967. Apertures of pollen grains and their evolution in angiosperms. Rev. Paleobot. Playnol. **3**: 73-80.

Metcalfe CR and L Chalk 1950. Anatomy of the dicotyledons 2, Oxford Univ. Press, London.

Ozorgucu B 1993. Bitki Morfolojisi ve Anatomisine Giriş, Ege Üniv. Fen Fak. Kitapları Serisi No. 136. İzmir.

Ozorgucu B, Y Gemici and I Turkan 1991. Karşılaştırmalı Bitki Anatomisi. Ege Üniv. Fen Fak. Yay. No. 129. İzmir.

Pehlivan S 1995. Türkiye'nin Alerjen Polenleri Atlası. ÜNAL OFFSET Matbaacılık Sanayi ve Tic. Ltd. Sti. Ankara.

Petrovic S, M Ristic, M Milenkovic, J Kukic, J Antic-Stankovic and M Niketic 2006. Composition and antimicrobial activity of essential oil of *Stachys plumosa* Griseb. Flavour Fragrance J. **21**: 250-252.

Pokrovskaia IM 1958. Analyse Pollinique. Publie avec l'aide du Centre National de la Recherche Scientifique. Moscou. Numero **24**: 398-431.

Rabbani M, SE Sajjadi and HR Zarei 2003. Anxiolytic effects of *Stachys lavandulifolia* Vahl on the elevated Plus-maze model of anxiety in mice. J. Ethnopharmacol. **89**: 271-276, 290.

Rabbani M, SE Sajjadi and A Jalali 2005. Hydroalcohol extract and fractions of *Stachys lavandulifolia* Vahl: effects on spontaneous motor activity and elevated plus-maze behaviour. Phytotherapy Res. **19**: 854-858.

Takhtajan AL 1980. Outline of the classification of flowering plants (Magnoliophyta). Bot. Rev. **46**: 225-359.

Uysal I 1998. *Stachys thirkei* C. Koch Türünün Morfolojisi, Anatomisi ve Ekolojisi Üzerinde İncelemeler. II. Kızılırmak Uluslar arası Fen Bilimleri Kongresi Bildirileri. Kırıkkale.

Uysal I 2002. *Stachys cretica* L. subsp. *smyrnaea* Rech Fil. Endemik Taksonunun Morfolojisi, Anatomisi ve Ekolojisi Üzerinde Araştırmalar. Ekoloji **11** (42): 16-20.

Walker JW 1974a. Evolution of exine structure in the pollen of primitive agiosperms. Amer. J. Bot. **61**: 891-902.

Walker JW 1974b. Aperture eolution in the pollen of primitive agiosperms. Amer. J. Bot. **61**: 1112-1137.

Wodehouse RP 1935. Pollen grains. McGraw Hill, New York.

Yentur S 1995. Bitki Anatomisi. İst. Üniv. Yay. No. 3803. İstanbul.

Yesilada E, E Sezik, G Honda, Y Takaishi, Y Takeda and T Tanaka 1999. Traditional medicine in Turkey V. Folk medicine in the inner Taurus Mountains. J. Ethnopharmacol. **64**: 195-210.

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