

## MORPHOLOGICAL STUDIES ON *THYMUS* L. GROWING IN ESKİŞEHİR<sup>1</sup>

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### S U M M A R Y

In this study, species of *Thymus* growing in Eskişehir have been morphologically investigated. Four *Thymus* species and altogether five taxa of which one is endemic were found to be native to the area. These are: *T. sibthorpii* Bentham, *T. sipyleus* Boiss., *T. leucostomus* Hausskn. & Velen. var. *argillaceus* Jalas and *T. longicaulis* C.Presl subsp. *longicaulis* var. *subisophyllus* (Borbis) Jalas, subsp. *chaubardii* (Boiss. & Heldr. ex Reichb. fil) Jalas var. *chaubardii*. *T. leucostomus* is an endemic species to Turkey. In morphological studies, detailed descriptions of the species and characteristic features are given. General appearance of plants, leaf, bract, flower, calyx, corolla and fruit shapes have also presented. All species were gynodioecious. Our findings about *T. sibthorpii* and *T. sipyleus* are contradict those of Jalas in Flora of Turkey. It is apparent that taxonomic studies of these species should still be pursued further. *T. longicaulis* subsp. *chaubardii* var. *chaubardii* is a new record for the B3 square. Additionally, *T. sipyleus* and *T. longicaulis* subsp. *longicaulis* var. *subisophyllus* has been collected in the vicinity of Eskişehir for the first time compared to the records in Flora of Turkey. *T. leucostomus* var. *argillaceus* has been observed to be the most widespread species in Eskişehir.

<sup>1</sup> This study is a part of Master Thesis named "Morphological and Anatomical Studies on *Thymus* L. Species Growing in Eskişehir". It's presented as a poster on 2<sup>th</sup> Balkan Botanical Congress, 14-18 May 2000, Istanbul.

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## Ö Z E T

Bu çalışmamızda Eskişehir'de yetişen *Thymus* türleri morfolojik yönden incelenmiştir. Araştırmalarımızın sonucunda bu bölgede biri endemik olan dört *Thymus* türünün ve beş taksonun yetiştiğini saptadık. Bu taksonlar: *T. sibthorpii* Bentham, *T. sipyleus* Boiss., *T. leucostomus* Hausskn. & Velen. var. *argillaceus* Jalas ve *T. longicaulis* C.Presl subsp. *longicaulis* var. *subisophyllus* (Borbas) Jalas, subsp. *chaubardii* (Boiss. & Heldr. ex Reichb. fil) Jalas var. *chaubardii*. Bu türlerden *T. leucostomus* Türkiye için endemiktir. Morfolojik çalışmalarda türlerin ayrıntılı tanımları verilmiştir. Bitkilerin genel görünüşleri, yaprak, brakte, çiçek, kaliks, korolla ve meyva şekilleri ilave edilmiştir. Bütün taksonlar ginodioiktir. *T. sibthorpii* ve *T. sipyleus* ile ilgili bulgularımız Flora of Turkey'de Jalas'ın bulguları ile çelişmektedir. Bu türler üzerinde taksonomik çalışmaların sürdürülmesi gereği ortaya çıkmıştır. *T. longicaulis* subsp. *chaubardii* var. *chaubardii* B3 karesi için yeni kayıttır. *T. sipyleus* ve *T. longicaulis* subsp. *longicaulis* var. *subisophyllus* ise Eskişehir'den ilk kez toplanmıştır (Flora of Turkey'deki kayıtlara göre). *T. leucostomus* var. *argillaceus*'un Eskişehir'de en yaygın tür olduğu gözlenmiştir.

**Key words:** *Labiatae*, *Thymus*, Morphology

## I N T R O D U C T I O N

The genus *Thymus* (*Labiatae*) is small shrubs, cushion plants or perennial herbs, being woody at least at base. It is represented about 40 species and 64 taxa, which have widespread distribution in Turkey, especially in central, east and south Anatolia, 24 of them are endemic (1-4). This genus is rich in the number of species and has also taxonomical problems. On the other hand, many aerial parts of *Thymus* species are used as tea for their medicinal properties by people and are the constituent of many pharmaceutical preparations. For instance, *T. sibthorpii* Bentham is known as "kekik" and used for flu and asthma in Tekirdag-Hayrabolu; *T. sipyleus* Boiss. is known as "Çal çayı", "sinekkanadı" or "dağ çayı" in Fethiye-Mugla, Arpacik village-Çal mountain around Mersin is used as herbal tea. *T. longicaulis* C. Presl subsp. *longicaulis* var. *subisophyllus* (Borbas) Jalas is known as "taş kekiği" in Balıkesir and its villages and it is used as tea for stomachache and diabetes. Around Bilecik, Bozüyük, Göynücek is known as "keklik otu" and it is used for stomachache (5-15).

In this study, *Thymus* species growing in Eskisehir were investigated from morphological point of view comparatively.

## M A T E R I A L a n d M E T H O D

The material for the study was collected from different populations of Eskisehir. Voucher specimens are kept in the Herbarium of the Anadolu University, Faculty of Pharmacy (ESSE). Identification of the specimens were made according to Flora of Turkey and the East Aegean Islands (1). Description of each species was made by using fresh samples however measurements were made on softened herbarium samples in water. 10-20 samples were assessed for each taxonomic characterization. The measurements given in descriptions were obtained from the large area of related organs and in the leaves of the stem, the measurements of the leaves cover only the middle leaves of the stem. Morphological illustrations of organs as leaves or flowers were made using a Wild M5A stereomicroscope with a drawing tube.

## R E S U L T S

As a result of our investigations we found four species and five taxa of *Thymus* growing in Eskisehir: *T. sibthorpii* Benth., *T. sipyleus* Boiss., *T. leucostomus* Hausskn. & Velen var. *argillaceus* Jalas (Endemic), *T. longicaulis* C. Presl subsp. *longicaulis* var. *subisophyllus*, (Borbás) Jalas subsp. *chaubardii* (Boiss. & Heldr. ex Reichb. fil.) Jalas var. *chaubardii*

### *T. sibthorpii* Benth. (Fig. 1-2)

Syn: *T. tosevii* Velen. in Sitz.-Ber. Böhm. Ges. Wiss. 1903 (28): 15 (1904). *T. marschallianus* Willd. subsp. *tosevii* (Velen.) Guşul., Fl. RPR 8: 313 (1961). *T. kosteleckyanus* Opiz. var. *macedonicus* Degen & Urumov in Mag. Bot. Lap. 19:20(1922). *T. macedonicus* (Degen & Urumov) Ronniger in Feddes Rep. 20: 336 (1924). *T. korthiaticus* Adam. ex Ronniger in Feddes Rep. 20: 334 (1924).

Subshrub plants, woody stems ascending or procumbent, with creeping sterile shoot, forming cushions. **Flowering stems** 4-20,5 cm, cylindrical-quadrangular, erect in rows on woody branches, simple or branched, glandular and eglandular hairy, eglandular hairs various: long or short, reflexed, straight, oil dots red, yellow or colourless. **Stem leaves:** Basal ones very small, ovate, caducous, middle and upper ones oblanceolate to elliptic-linear, 9,2-16x2-3 mm, sessile, subacute or obtuse at apex,

margin serrulate or entire, ciliate, lateral veins 2-3 pairs, usually prominent, both side with long reflexed hairy or not, oil dots like those of stem. **Axillary leaf fascicles** well developed but sparse basal ones, fascicle leaves elliptic-linear or linear, 2,6-6x1-1,5 mm. **Inflorescence** 1-8(-10,5) cm, interrupted or head in form, verticillasters 2-24(-28) flowered. **Bracts** similar to leaves, oblanceolate to elliptic-linear, 4-13x1,3-3,1 mm. **Bracteoles** linear, 1-2,5x0,4-0,8 mm, green, shorter than pedicels, ciliate. Plant gynodioecious. **In hermaphrodite flowers:** pedicels 1-5 mm, hairy, calyx green, 2,5-3,5 mm, tubulate-campanulate, ten veined, veins prominent, bilabiate, upper lip with 3 teeth, teeth 0,6-1x0,9-1 mm, recurved, acute-acuminate, ciliate, lower lip two toothed, teeth 1,5-2x0,4-0,5 mm, subulate, ciliate, upper lip equalling or shorter than lower teeth, tube 1-1,5 mm, cylindrical, shorter than lips, straight or reflexed hairy, oil dots red or yellow and in interveins, throat straight hairy. **Corolla** 4-5 mm, tubulate-campanulate, bilabiate, usually purple, lower parts of lips white, with purple spots, sometimes white, tube straight, exserted from calix, upper lip 2 lobed, retus, lower lip 3 equalling lobed, lobes 1-1,5 mm, rotundate, hairy and red or yellow oil dotted. **Stamens** 4, didynamous, upper pairs shorter than lower ones and exceeding corolla; **Filaments** 1,5-3,5 mm, white, anthers 0,4-0,6 mm, purple, dorsifixed, pollen grains cream coloured. **Ovary** 4 lobed, lobes 0,2-0,4 mm, oblong. **Stylus** gynobasic, bifid above, branches subulate, white with purple apex, exserted from corolla. **Nutlets** 0,6-1x0,6-0,9 mm, light or dark brown, usually orbiculate, trigonal sometimes rotundate-trigonal with smooth surface. **Mal-steril flowers** have smaller (2,5-4 mm) and white corollas, steril stamens are hidden in the tube. Their stylus usually exceeding corolla.

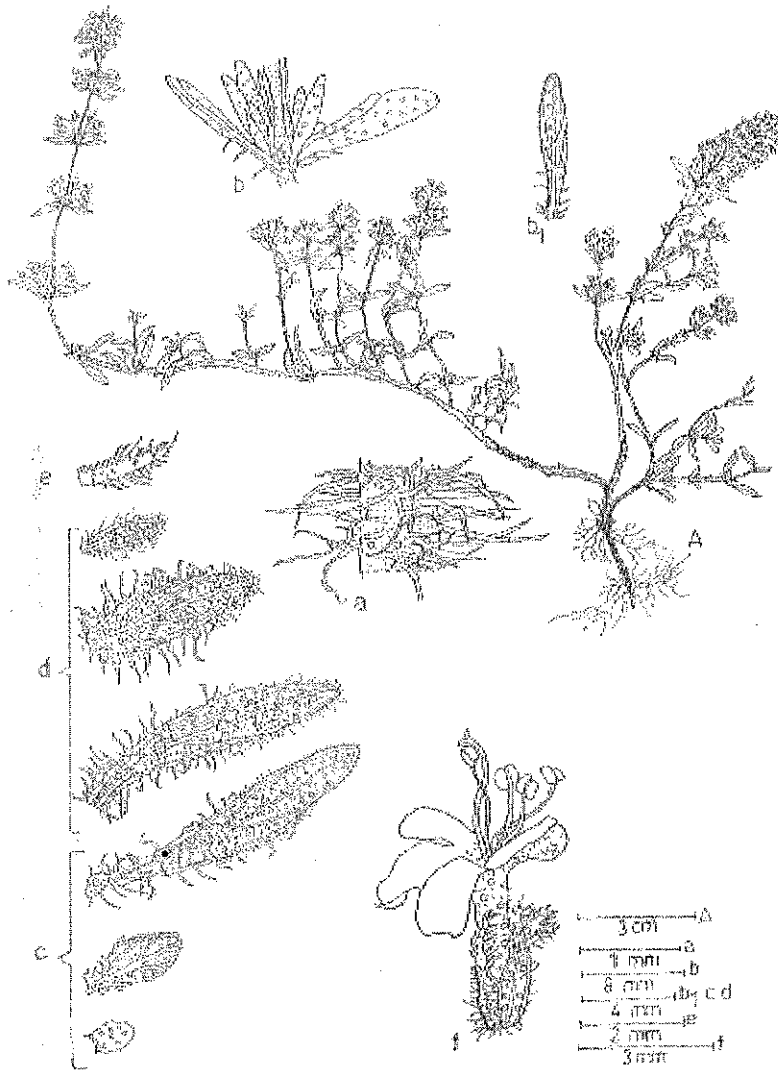
Flowering period: May-September

Habitat: Dry slopes, open *Pinus* forests

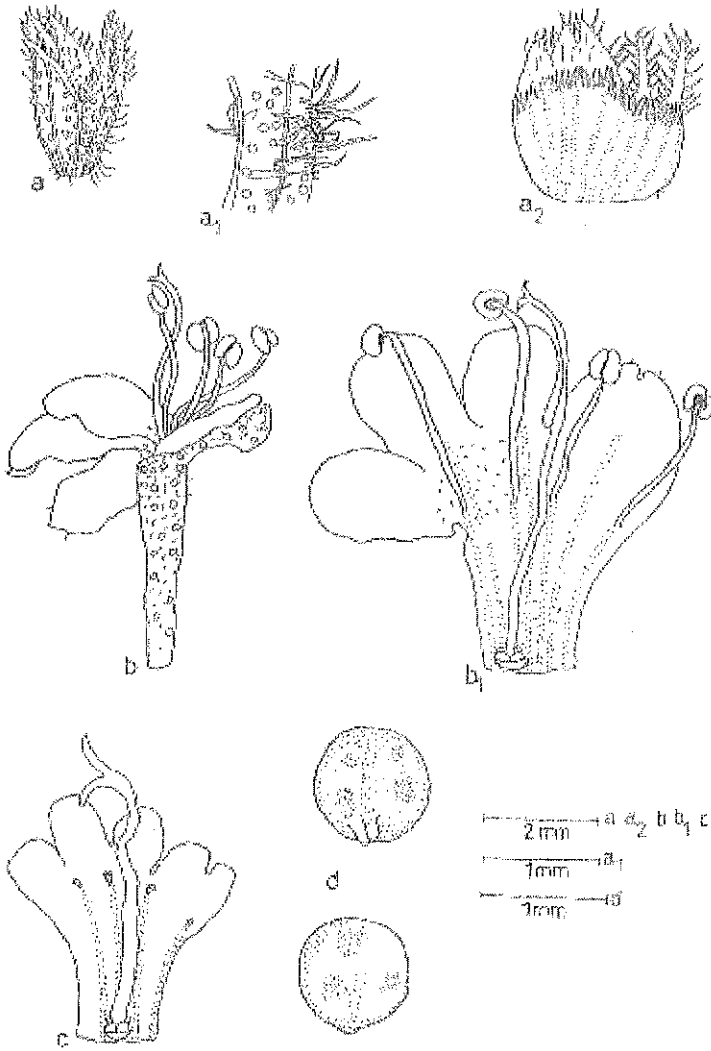
Altitude: to 1550 m

Distribution in Turkey N.W. Turkey, C. Anatolia (1)

**Specimens examined:** B3 ESKİŞEHİR: Mihalıççık, 1500 m, 8.7.1996, S.Alan, M.Alan, ESSE 12220! Bozdağ, 9.7.1987, K.H.C.Başer, ESSE 7880!



**Fig. 1:** *T. sibthorpii* (ESSE 12220); A. Habit, a. Stem, b. Axillary leaf fascicles, b<sub>1</sub>. A leaf of fascicle c. Cauline leaves, d. Floral leaves, e. Bracteole f. Hermaphrodite flower



**Fig. 2:** *T. sibthorpii* (ESSE 12220); a Calyx, a<sub>1</sub> Calyx hairs, a<sub>2</sub>, Calyx inside, b. Corolla, b<sub>1</sub>, Corolla inside, pistil, stamens, c. Corolla inside of male sterile flower, d. Nutlets.

***Thymus sipyleus* Boiss., Diagn. ser. 1(5):16 (1844). (Fig. 3-4)**

Syn: *T. parvifolius* C. Koch in *Linnaea* 21:266 (1848); *T. rariflorus* C. Koch, loc. cit. (1848); *T. squarrosus* Fisch. & Mey. in *Ann. Sci. Nat. ser. 4*, 1:32 (1854); *T. serpyllum* L. var. Syn: *T. punctatus* Vis., III. Pi. Grecia: 7 (1842) non Willd. (1794); *T. imbricatus* Celak. in *Flora* 67: 535 (1884); *T. rigidus* Schott & Kotschy ex Celak. in *Flora* 67: 536 (1884); *T. sedoides* Celak. in *Öst. Bot. Zeitschr.* 37: 266 (1887); *T. jankae* Celak. subsp. *imbricatus* (Celak.) Velen. in *sitz. -Ber. Böhm. Ges. Wiss.* 1903(28): 21 (1904); *T. punctatus* Vis. var. *sipyleus* (Boiss.) Ronniger in *Beih. Bot. Centr.* 54B: 664 (1936); *T. sipyleus* Boiss. var. *imbricatus* (Celak.) Ronniger in *Rechb. fil., Fl. Aeg.* 540 (1943); *T. sipyleus* Boiss. var. *punctatus* (Vis.) Ronniger in *Kew Bull.* 1949: 425 (1949); var. *davisianus* Ronniger *squarrosus* (Fisch. & Mey. Boiss., *Fl. Or.* 4:556 (1879) p.p.; *T. serpyllum* L. var. *angustifolius* sensu Boiss., *Fl. Or.* 4:556 (1879) p. non; *T. angustifolius* Pers.; *T. zygioides* Griseb. b) *T. rosulans* Borbas in *Math. Term. Közl.* 24:61 (1892); *T. rariflorus* C. Koch var. *ponticus* Ronniger in *Feddes Rep.* 31:152 (1932)! Ic: *Fl. URSS* 21: t. 30 f. 4 (1954).

Subshrub plants, woody stems ascending or procumbent, with creeping sterile shoot, forming cushions. **Flowering stems** 1-7(-9) cm, quadrangular, erect in rows on woody branches, usually simple, glandular and eglandular hairy, eglandular hairs short, reflexed, oil dots usually red, sometimes yellow. **Stem leaves:** basal ones very small, ovate, linear, caducus, middle and upper stem leaves ovate to ovate-lanceolate, linear to linear-lanceolate, 3-8x1,5-2,5 mm, sessile, ± succulent, acute-obtuse at apex, margin serrulate, ciliate, lateral veins 2-3 pairs, prominent to indistinct, joining to form a marginal thickening, both side glabrous, oil dots like those of stem. **Axillary and basal leaf fascicles** densely, fascicle leaves ovate or elliptic-linear, 1,8-5x0,8-1 mm, ± succulent. **Inflorescence** 0,5-2,5 cm, densely head in form, verticillasters (2-)6(-9) flowered. **Bracts** similar to leaves, 3-8x1,5-3,9 mm. **Bracteoles** lanceolate, 1-2,5(-3) x 0,5-0,7mm, nearly equalling pedicels, ciliate. Plant gynodioecious. **In hermaphrodite flowers:** pedicels 1-3 mm, hairy, calyx green, sometimes with purple tooth, 3-4,5 mm, tubulate-campanulate, ten veined, veins prominent, bilabiate, upper lip with 3 teeth, teeth 0,6-1x0,7-1 mm, recurved, acute, usually ciliate, middle tooth sometimes longer and broader, lower lip two teeth, teeth 1,8-2,5x0,4-0,9 mm, subulate, ciliate, tube 1,3-2 mm, cylindrical, ± equalling or shorter than lips, long reflexed hairy, oil dots yellow, throat straight hairy. **Corolla** 4-6 mm, tubulate-campanulate, bilabiate, white or pink, purple or pink spotted, tube white, straight, exerted from calix, upper lip 2 lobed, retus, lower lip 3 equalling lobed, lobes 1-2 mm, rotundate, with hairy and usually yellow oil dotted. **Stamens** 4, didynamous, upper pairs shorter than lower ones and exceeding corolla; **Filaments** 1-3 mm, white, anthers 0,4-0,5 mm, purple, dorsifixed,

pollen grains cream coloured. **Ovary** 4 lobed, lobes 0,2-0,3 mm, oblong. **Stylus** gynobasic, bifid above, branches subulate, white with purple apex. **Nutlets** 0,6-1,1x0,6-1 mm, brown, usually orbiculate-trigonal, sometimes rotundate-trigonal with smooth surface. **Mal-steril flowers** have smaller (3-4 mm) and white corollas, steril stamens are hidden in the tube. Their stylus usually exceeding corolla.

Flowering period: May-September

Habitat: Mountain steppes, rocky slopes

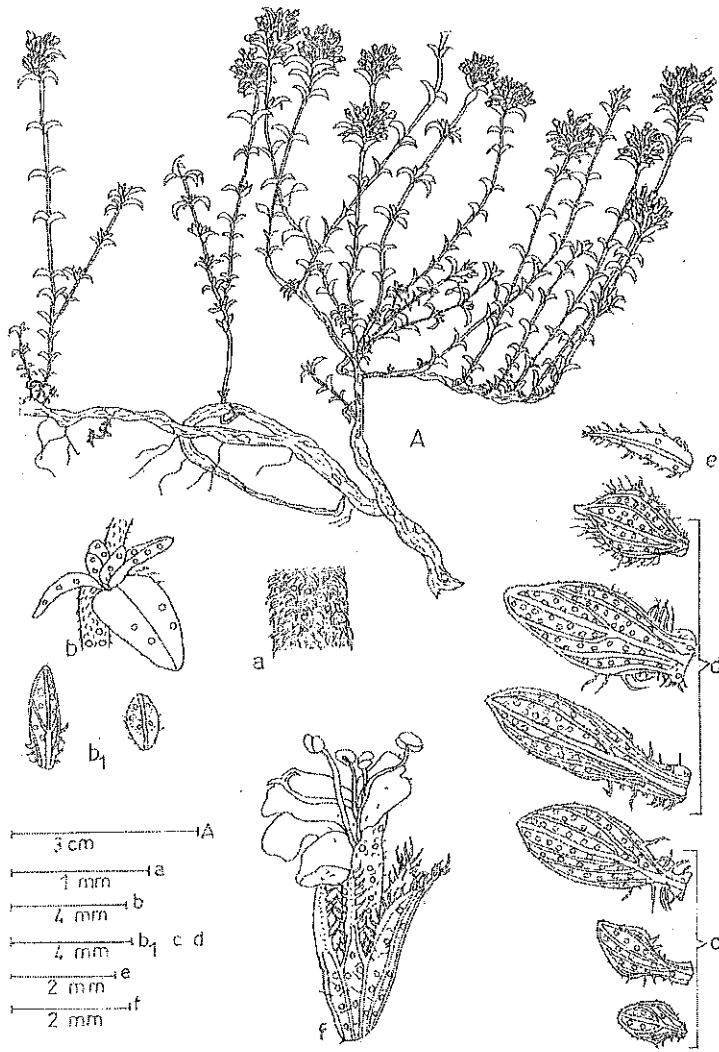
Altitude: to 1200 m

Distribution in Turkey W, S, S.W, N, N.E, Turkey, C. Anatolia (1)

***Endemic***

**Specimens examined: B3 ESKİŞEHİR:** Bozdağ, back side of the Şoförler çeşmesi, hillside, 1200 m, 6.7.1996, S.Alan, M.Alan, ESSE 12221! Bozdağ, Şoförler çeşmesi, 7.6.1992, N.Ermin, ESSE 10377! Bozdağ, Şoförler çeşmesi, 1200m, 17.6.1988, Y.Akyol, N.Kurtar, ESSE 8616!





**Fig. 3:** *T. sipyleus* (ESSE 12221); a. Habit, a. Stem, b. Axillary leaf fascicles, b<sub>1</sub>. A leaf of fascicle, c. Cauline leaves, d. Floral leaves, e. Bracteole, f. Hermaphrodite flower

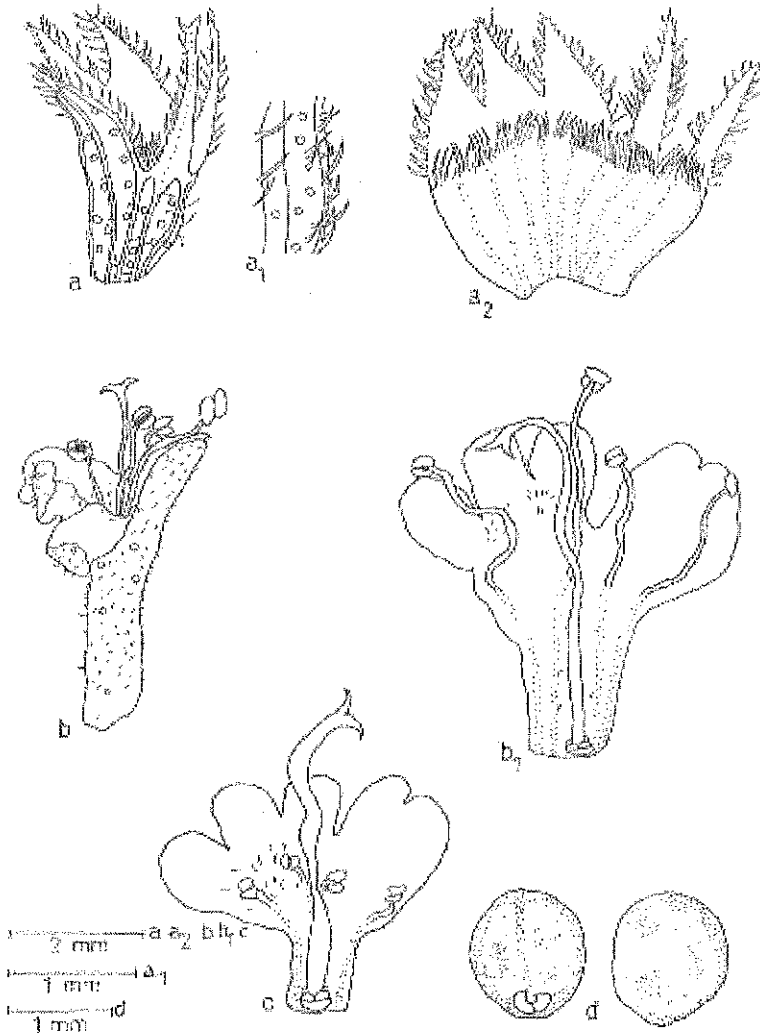


Fig. 4: *T. sipyleus* (ESSE 12221); a. Calyx, a<sub>1</sub>. Calyx hairs, a<sub>2</sub>. Calyx inside, b. Corolla, b<sub>1</sub> Corolla inside, pistil, stamens, c. Corolla inside of male sterile flower, d. Nutlets

*Thymus leucostomus* Hausskn. & Velen. in Beih. Bot. Centr. 19(B2):282(1906).  
 var. *argillaceus* Jalas in Ann. Bot. Fennici 17:322 (1980) (Fig. 5-6)

Subshrub plants, woody stems ascending or procumbent, with creeping sterile shoot, forming cushions. **Flowering stems** 4-15 cm, quadrangular- cylindrical, erect, in

rows on woody branches or not, usually simple, glandular and eglandular hairy, eglandular hairs short and reflexed, oil dots usually red, sometimes colourless. **Stem leaves:** Basal ones very small, ovate, caducous, middle and upper stem leaves linear, 3-8x(0,8-)1-1,7(-1,8) mm, sessile, succulent, acute-obtuse at apex, margin serrulate, ciliate, lateral veins 2 pairs, slightly prominent, usually glabrous both side, rarely long, reflexed or straight hairy, oil dots like those of stem. **Axillary and basal leaves fascicles** densely, fascicle leaves ligulate or linear, 0,5-3x0,5-1 mm, succulent. **Inflorescence** (0,3-)0,4-6 cm, capitate or interrupted in form, verticillasters 2-10 flowered. **Bracts** similar to leaves, linear to ovate-elliptic, 2,5-7(-7,5)x0,9-2 mm. **Bracteoles** lanceolate, (0,6-)1-3x0,5-0,9 mm, green, usually longer than pedicels, ciliate. Plant gynodioecious. **In hermaphrodite flowers:** pedicels 0,5-3 mm, hairy, calyx green, (2,5-)3-4,5(-5) mm, tubulate-campanulate, ten veined, veins prominent, bilabiate, upper lip with 3 teeth, teeth 0,5-1,5x(0,4-)0,6-1,1 mm, ovate-triangular, recurved, acute, margin usually serrulate, rarely ciliate, lower lip two teetheed, teeth (1,1-)1,5-2,8x0,3-1 mm, subulate, ciliate, upper lip equalling lower teeth, tube 1-2 mm, cylindrical, usually shorter than lips or subequal, straight or reflexed hairy, oil dots usually red and in interveins, throat with straight hairy. **Corolla** 4-6 mm, tubulate-campanulate, bilabiate, usually white, rarely pink, whit purple spot or not lower parts of lips white, tube straight, in calix, upper lip 2 lobed, retus, lower lip 3 equalling lobed, lobes 1,5-2,3 mm, rotundate, with hairy and oil doted usually red or yellow. **Stamens** 4, didynamous, upper pairs shorter than lower ones and exceeding corolla; **Filaments** 2-3 mm, white, anthers 0,4-0,6 mm, purply-pink, dorsifixed, pollen grains cream coloured. **Ovary** 4 lobed, lobes 0,1-0,5 mm, oblong. **Stylus** gynobasic, bifid above, branches subulate, white with purple apex, exerted from corolla. **Nutlets** (0,5-)0,6-1,1(-1,2)x(0,5-)0,6-1 mm, brown, usually orbiculate, sometimes rotundate, trigonal with smooth surface. **Mal-steril flowers** have smaller (2-4 mm) and white corollas, steril stamens are hidden in the tube. Their stylus usually exceeding corolla.

Flowering period: May-September

Habitat: Dry hillsides, fields and roadsides on chalky and loamy ground

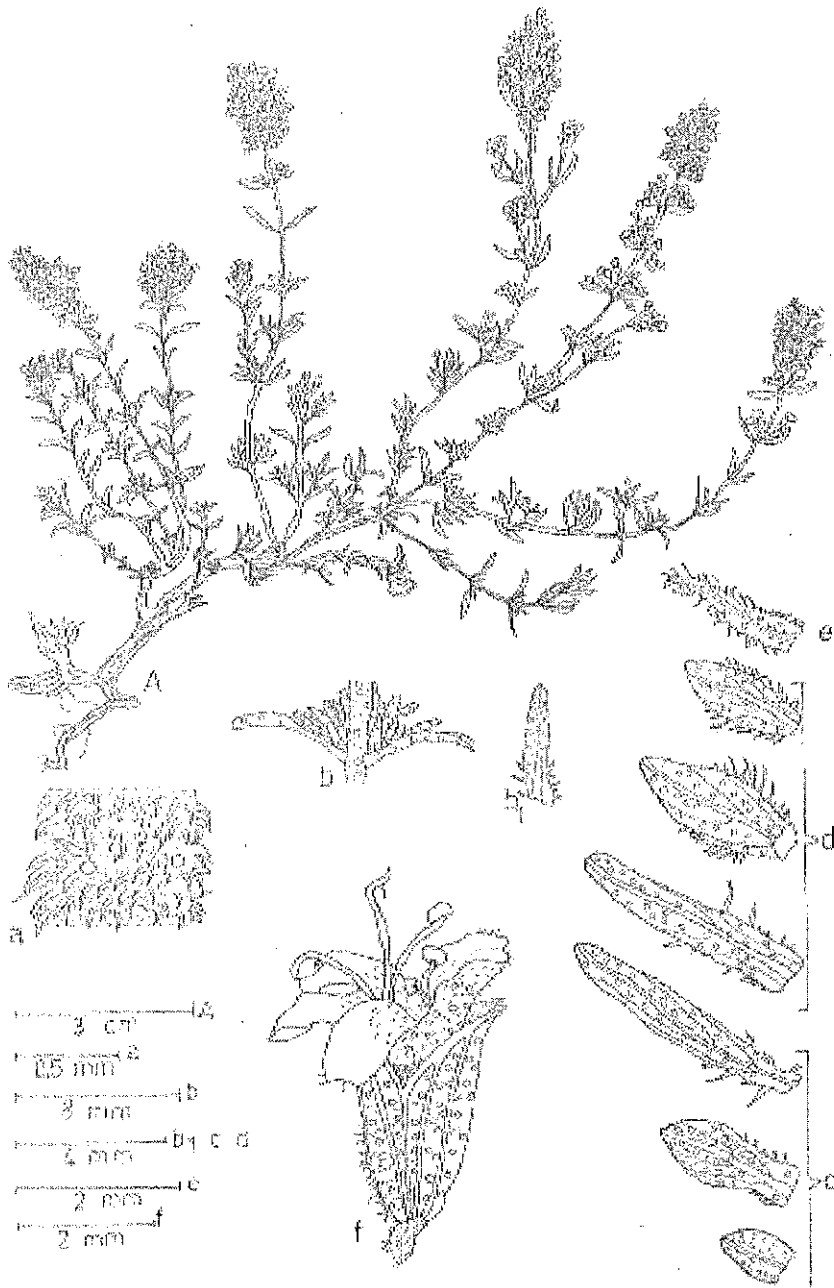
Altitude: to 800-900 m

Distribution in Turkey: C. Anatolia (1)

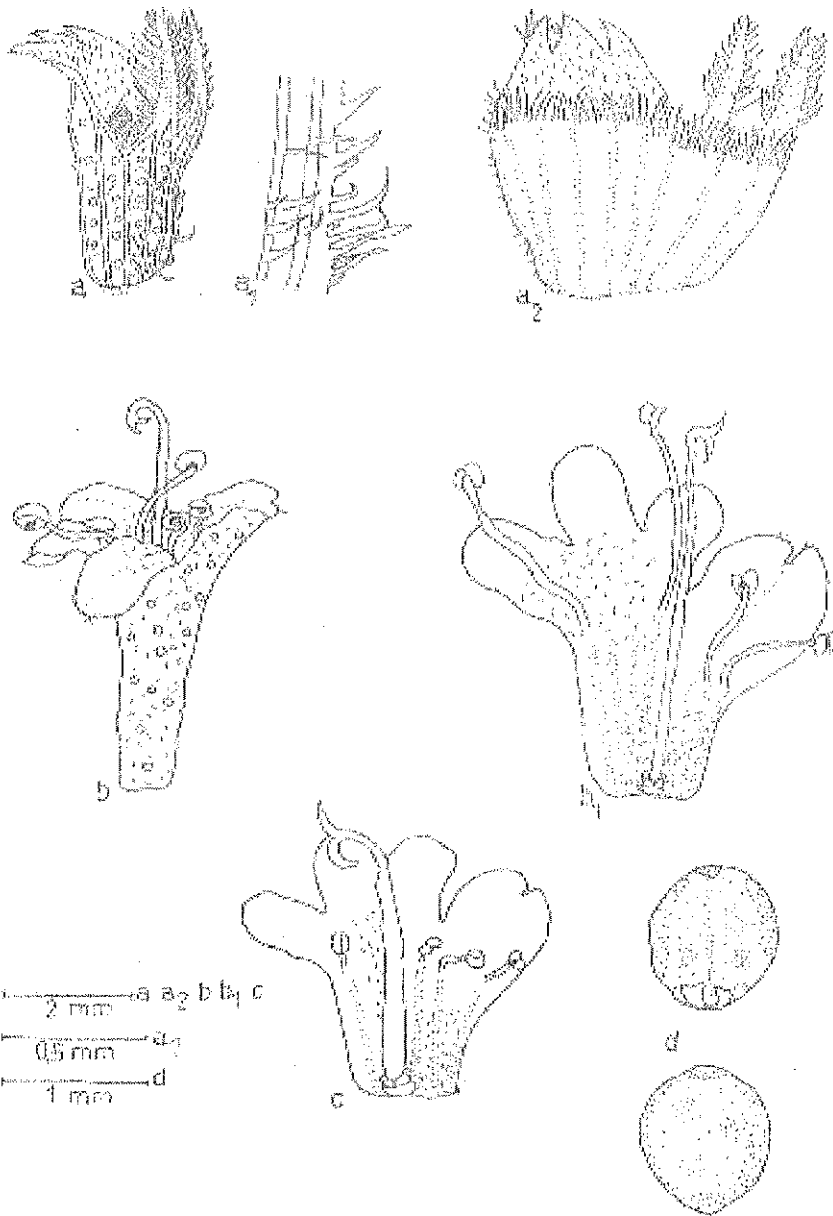
#### Endemic

**Specimens examined: B3 ESKİŞEHİR:** Kızılınler road, near Gökçekısıık village, roadside, slopes, 700 m, 18.6.1995 S. Alan, M. Alan, ESSE 12200! Kızılınler road, Gökçekısıık village, roadside, slopes, 700 m, 5.7.1996, S. Alan, M. Alan, ESSE 12201! After 2 km from Kızılınler, roadside, slopes, 750 m 18.6.1995, S. Alan, M.

Alan, ESSE 12202! After 2 km from Kızılınler, roadside, slopes, 750 m, 5.7.1996, S.Alan, M. Alan, ESSE 12203! 5 km to Aşağıkalabak village, roadside, slopes, 700 m, 18.6.1995 S.Alan, M.Alan, ESSE 12204! 5 km to Aşağıkalabak village, road side, slopes, 700 m, 5.7.1996, S.Alan, M.Alan, ESSE 12205! Seyitgazi, Kırka-İkizoluk, Kırka 8. km, roadside, slopes, 750 m, 24.6.1995, S. Alan, M. Alan, ESSE 12206! Seyitgazi, Kırka-İkizoluk, Kırka 8. km, roadside, slopes, 750 m, 6.7.1996, S. Alan, M. Alan, ESSE 12207! Seyitgazi-Kırka, 2 km to Kırka, roadside, slopes, 750 m, 24.6.1995, S. Alan, m, 6.7.1996, S. Alan, M. Alan, ESSE 12209! Kırka-Seyitgazi, 8 km to Seyitgazi, slopes, 700 m, 24.6.1995, S. Alan, M. Alan, ESSE 12210! Kırka-Seyitgazi, 8 km to Seyitgazi , slopes, 700 m, 6.7.1996, S. Alan, M. Alan, ESSE12211! Alpu-Eskişehir 15. km, Ağapınar village, slopes, 700 m, 5.7.1995, S.Alan, M. Alan, ESSE 12212! after 2 km from Mihaliçık, roadside, slopes, 700 m, 5.7.1995, S. Alan, M. Alan, ESSE 12213! Sivrihisar, Sivrihisar-Ankara 5. km, slopes, 700 m, 5.7.1995, S.Alan, M. Alan, ESSE 12214! Bozdağ, nearly Emirce village, fields, 11.7.1990, V.Bozkurt, ESSE 8951! Mihaliçık-Alpu 21 km, hill and slopes, 900 m, K.H.C.Başer 1129, A.Altıntaş, ESSE 11434! Gündüzler village, 8.1994, K.H.C.Başer, ESSE 10720! Yenice village, around Karaçalı, 12.6.1991, K.H.C.Başer, A. Kaya ESSE9143! Eskişehir-Ankara 20 km, 23.6.1987, K.H.C.Başer, ESSE 7739! Eskişehir-Kütahya road, slopes, 1973, K.H.C.Başer, ESSE 180! Bozdağ, 18.7.1987, K.H.C.Başer, ESSE 7566! Gündüzler village, 3.6.1994, İ.Irmak, ESSE 10720! Bozdağ, Sultandere village, 8.6.1990, V.Bozkurt, ESSE 10268! Alpu-mihaliçık 23 km, Doğanoglu village exit, roadside, calcerous area, 900m, 3.6.1995, K.H.C.Başer, F.demirci, ESSE 11782! Bozdağ, Kahvecik village, 7.1990, G.Tümen, ESSE 8977! Bozdağ, 18.7.1987, K.H.C.Başer , ESSE 7881! Bozdağ, 7.7.1987, ESSE 7597! Sündiken Da., Mayıslar, around Gerca, c.250 m, 4.6.1971, T. Ekim, ANK 624! Eskişehir-Ankara road, 27.5.1977, A.Baytop, ISTE 36883!



**Fig. 5:** *T. leucostomus* var. *argillaceus* (ESSE 12200, 12202, 1204); A. Habit, a. Stem, b. Axillary leaf fascicles, b<sub>1</sub> A leaf of fascicle, c. Cauline leaves, d. Floral leaves, e. Bracteole f. Hermaphrodite flower



**Fig. 6:** *T. leucostomus* var. *argillaceus* (ESSE 12200, 12202, 1204); a. Calyx, a<sub>1</sub>. Calyx hairs, a<sub>2</sub> Calyx inside, b. Corolla, b<sub>1</sub>. Corolla inside, pistil, stamens, c. Corolla inside of male sterile flower, d. Nutlets

*Thymus longicaulis* C.Presl, Fl. Sic. 37 (1826)

Subshrub plants, woody stems ascending or procumbent, with creeping sterile shoot, forming cushions. **Flowering stems** 3-15 cm, usually quadrangular, erect in rows on woody branches, simple or branched, glandular and eglandular hairy, eglandular hairs long and short reflexed or straight, oil dots usually red, sometimes colourless. **Stem leaves:** Basal ones very small, ovate, caducus, middle and upper stem leaves oblanceolate or linear-oblanceolate, oblong-linear, 4-13,5x1-4,5(-5) mm, sessile, acute-obtuse at apex, margin serrulate or entire, ciliate, lateral veins 2-3 pairs, usually prominent joining to form a marginal thickening, both side hairless to dense hairy, hairs long or short reflexed or straight, oil dots like those of stem. **Axillary and basal leaf fascicles** sparse, fascicle leaves linear, 1,5-5,5x0,5-2,5 mm. **Inflorescence** 0,5-5,5 cm, capitate or interrupted in form, verticillasters 2-12(-17) flowered. **Bracts** similar to leaves, linear-oblong to elliptic-lanceolate, 2-13,5(-14,5)x0,7-4,5 mm. **Bracteoles** linear or lanceolate, 1-2,5x0,4-1 mm, purple or green, usually shorter than pedicels, ciliate. Plant gynodioecious. **In hermaphrodite flowers:** pedicels 1-5,5 mm, hairy, **calix** purple or green, 2,5-5 mm, tubulate-campanulate, ten veined, veins prominent, bilabiate, upper lip with 3 teeth, teeth 0,5-1,4x0,5-1 mm, recurved, pungent at apex usually ciliate, rarely serrulate, lower lip two teeth, teeth 1,5-3x0,3-1 mm, subulate, ciliate, upper lip equalling or longer than lower teeth, tube 1-2,5 mm, cylindrical, usually shorter (sometimes equalling) than lips, straight or reflexed hairy, oil dots usually red or yellow, rarely colourless and in interveins, throat with straight hairy. **Corolla** 4,5-6 mm, tubulate-campanulate, bilabiate, usually purple or lilac or whitish, lower parts of lips white, tube straight, exerted from calix, upper lip 2 lobed, retus, lower lip 3 equalling lobed, lobes 1-2 mm, rotundate, with hairy and red or yellow oil dotted. **Stamens** 4, didynamous, upper pairs shorter than lower ones and exceeding corolla; **Filaments** 1,5-4 mm, white, anthers 0,3-0,6 mm, purplish pink, dorsifixed, pollen grains cream coloured. **Ovary** 4 lobed, lobes 0,1-0,5 mm, oblong. **Stylus** gynobasic, bifid above, branches subulate, white with purple apex, exerted from corolla. **Nutlets** 0,6-1x0,5-1 mm, brown or black, usually orbiculate, sometimes rotundate, trigonal, with smooth surface. **Mal-steril flowers** have smaller (2,5-4 mm) and white corollas, steril stamens are hidden in the tube. Their stylus usually exceeding corolla.

Differentiative characters of subsp. *longicaulis* var. *subisophyllus*: Middle leaves of the stem 1-2,4 mm wide, upper calyx teeth 0,5-1 mm and equalling lower teeth, flowering stems hairy all round

Differentiative characters of subsp. *chaubardii* var. *chaubardii*: Middle leaves of the stem 2-4,5(-5) mm wide, upper calyx teeth 1-1,4 mm and exceeding lower teeth,

flowering stems hairy all round subsp. *longicaulis* var. *subisophyllus* (Borbas) Jalas in Ann. Bot. Fennici 11:263 (1974) (Fig. 7-8)

Syn. *T. chaubardii* (Boiss. & Heldr. ex Reichb. fil.) Celak. var. *subisophyllus* Borbas in Math. Term. Közl. 24: 90 (1890). *T. moesiacus* Velen. in Sitz.-Ber. Böhm. Ges. Wiss. 1903 (28): 16 (1904). *T. callieri* Borbas ex Velen. var. *microcalyx* Degen & Urumov in Spis. Balg. Akad. Nauk 5 (Kl. Prir.-Mat. 2):30 (1912). *T. thracicus* Velen. var. *byzantinus* Ronniger in Hayek, Prodr. Fl. Balc. 2:347 (1930). *T. punctatus* Vis. subvar. *subisophyllus* (Borbas) Ronniger in Hayek, Prodr. Fl. Balc. 2:361 (1930). *T. moesiacus* Velen. var. *subisophyllus* (Borbas) Ronniger in Rech. in Feddes Rep.Beih. 98: 45 (1938). *T. moesiacus* Velen. var. *turcicus* Ronniger in Rech. in Feddes Rep. Beih. 98: 45 (1938).

Flowering period: May-August

Habitat: Open woodland, rocky slopes, dry pastures

Altitude: s 1-2200m

Distribution in Turkey N.W. Turkey, C. & N.E. Anatolia (1)

**Specimens examined: B3 ESKİŞEHİR:** Sündiken Da., c. 1250 m, 2.6.1971, T.Ekim, ANK 105! Mihalıççık, Kartal hill, clearance of *Pinus nigra* and *Pinus sylvestris*, c. 1600 m, 4.7.1970, T.Ekim, ANK 625! Türkmen hill, around fire lower open rocky area, 1400 m, 26. 8. 1995, S. Alan, M. Alan, ESSE 12215! Türkmen hill, around fire lower, open rocky area, slopes, 1400 m, 27.6. 1996, S.Alan, B.Bozan, Z.Tunaher, M.Koşar, A.Altıntaş, F.Demirci, İ.Boydağ, ESSE 12216! Eskişehir to İstanbul 15. km., hillside, roadside, 2.7.1995, S.Alan, M.Alan, ESSE 12217! Eskişehir to İstanbul 15. km, hillside, roadside, 5.7.1996, S.Alan, M.Alan, ESSE 12218! Eskişehir-Yarımca, Bozdağ 21. km., 1100 m, 6.7.1996, S.Alan, M.Alan, ESSE 12219! Bozdağ, Çakırçayı-Atalantekke, 1100m, 14.7.1990, V.Bozkurt, ESSE 8950! Bozdağ-Karakoçan village, 7.1990, G.Tümen, ESSE 8976! Gündüzler village-Darısuğu, 24.5.1994, İ.Irmak, ESSE 11046! Bozdağ, 14.7.1990, G.Tümen, ESSE 9026! Türkmen hill, around fire lower, 14.6.1994, K.H.C.Başer, ESSE 10622! Eskişehir to Seyitgazi, 54 km to Yarımca, roadside, 19.6.1994, N.Öztürk, ESSE 10722! Bozdağ, 1973, K.H.C.Başer, ESSE 357!

**subsp. chaubardii** (Boiss. & Heldr. ex Reichb. fil.) Jalas in Ann. Bot. Fennici 17: 323 (1980). Fl. 5-7 **var. chaubardii** (Fig.9-10)

Syn: *T. serpyllum* L. subsp. *angustifolius* (Persl.) Boiss. var. *chaubardii* Boiss. & Heldr. ex Reichb. fil. in Reichb., Ic. Fl. Germ. 18:37 (1858). *T. angustifolius* Pers. var. *chaubardii* (Boiss. & Heldr. ex Reichb. fil.) Boiss. & Heldr. in Boiss.,Diagn. Ser.



2(4):5 (1859). *T. serpyllum* L. subsp. *chaubardii* (Boiss.& Heldr. ex Reichb. fil) Nyman, Consp. 594 (1881). *T. chaubardii* (Boiss.& Heldr. ex Reichb. fil) Celak in Flora 66: 172 (1883). *T. boeoticus* H. Braun in Mitt. Naturw. ver. Steierm. 54:262 (1918). *T. chaubardii* (Boiss.& Heldr. ex Reichb. fil) Celak. subvar. *boeoticus* (H.Braun) Ronniger in Beih. Hayek; Prodr. Fl. Balc. 2: 347 (1930). *T. chaubardii* (Boiss.& Heldr. ex Reichb. fil) Celak. var. *boeoticus* (H. Braun) Ronniger in Beih. Bot. Centr. 54(B): 662 (1936). *T. ocheus* Heldr. & Sart. ex Boiss. var. *chaubardii* (Boiss.& Heldr. ex Reichb. fil) Jalas in Ann. Bot. Fennici 11:263 (1974).

Flowering period: May-September

Habitat: Open coniferous woodland, rocky slopes, dry pastures

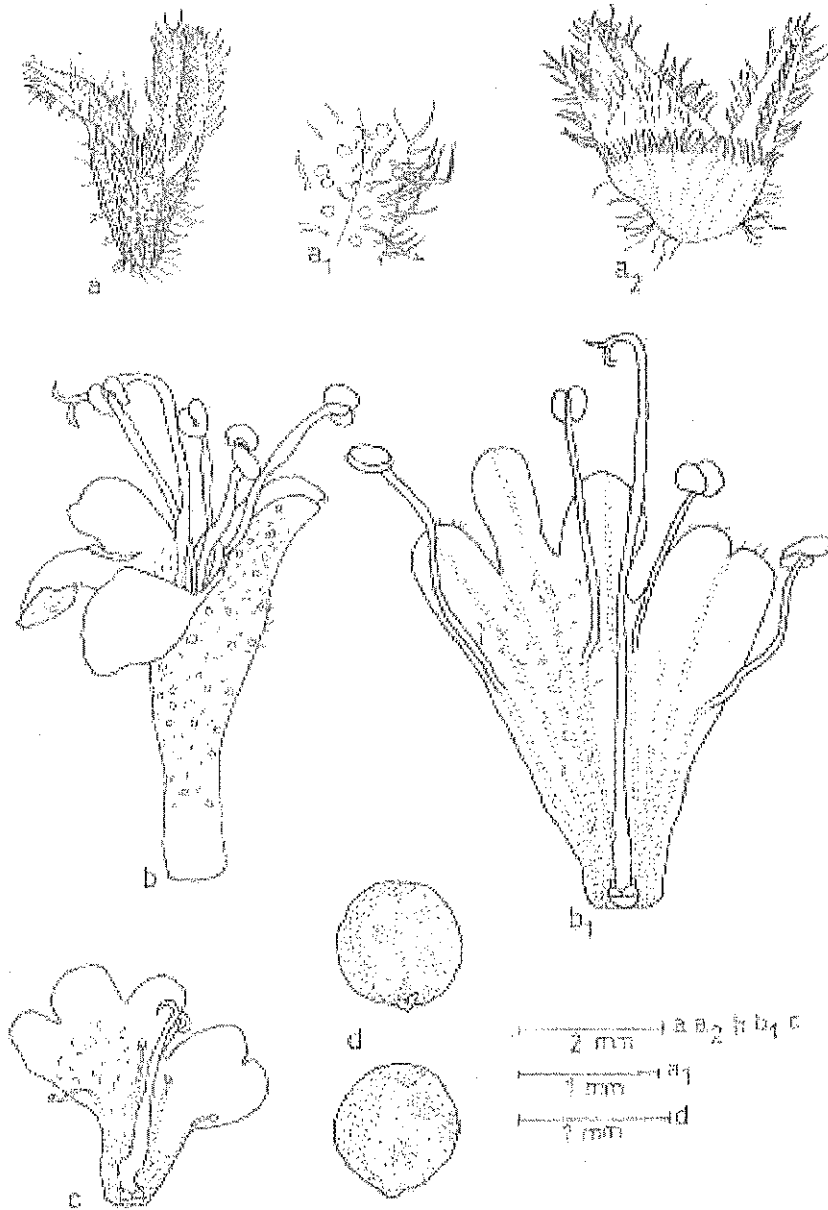
Altitude: 250-2200m

Distribution in Turkey N.W. & W Anatolia, Islands(1)

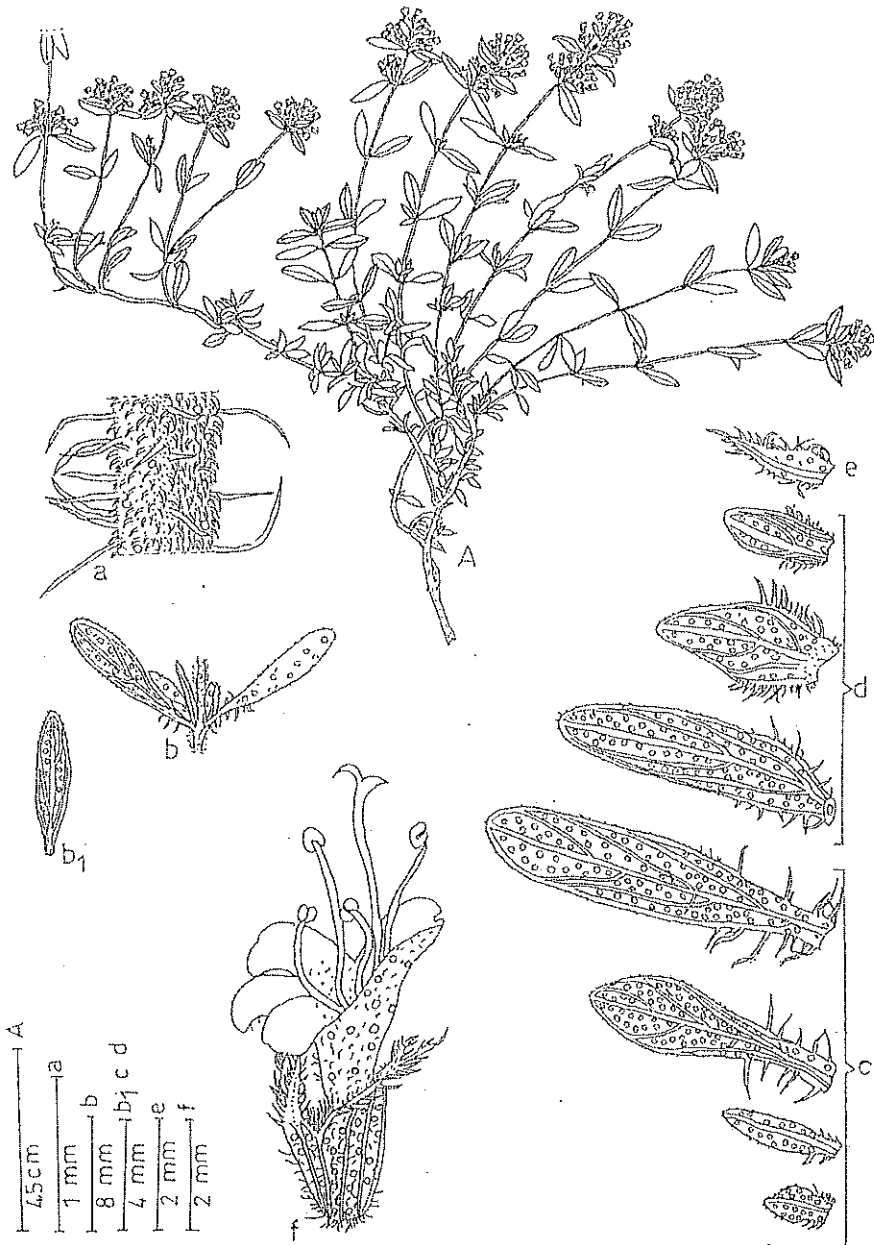
**Specimens examined:** B3 ESKİŞEHİR: Sündiken Da., 3.6.1971, T.Ekim, ANK 623! Karakütük, c. 1600 m, 1.7.1970, T.Ekim, ANK 623! Başören to Gökçekaya 3 km, 3.6.1994, K.H.C.Başer, S.Alan, A.Kaya, ESSE 11093! İnönü, Dutluca village- arond Hacımahmut, 8.6.1988, S.Kahya, ESSE 8436! Sarıcakaya, Sakarı Ilıca village, 11.6.1991, K.H.C.Başer, T.Özek, ESSE 91035! Kırka village, 5.6.1994, İ.Irmak, ESSE 10722!



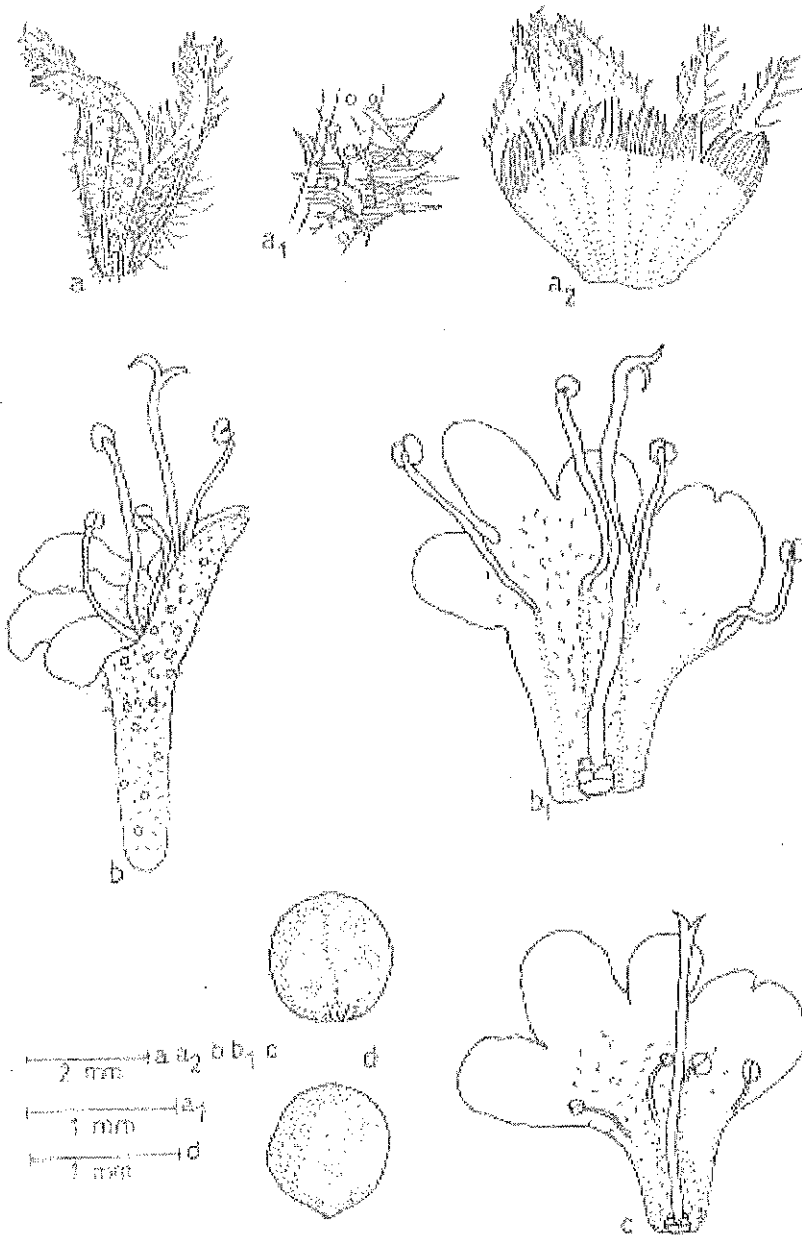
**Fig. 7:** *T. longicaulis subsp. longicaulis var. subsophyllus* (ESSE 12216); A Habit, a Stem, b. Axillary leaf fascicles, b<sub>1</sub> A leaf fascicles, c Cauline leaves, d Floral leaves, e Bracteole, f Hermaphrodite flower



**Fig. 8:** *T. longicaulis* subsp. *longicaulis* var. *subisophyllus* (ESSE 12216); a. Calyx, a<sub>1</sub>. Calyx hairs, a<sub>2</sub>. Calyx inside, b. Corolla, b<sub>1</sub>. Corolla inside, pistil, stamens, c. Corolla inside of male sterile flower, d. Nutlets



**Fig. 9.:** *T. longicaulis* subsp. *chaubardii* var. *chaubardii* (ESSE 11093); A Habit, a stem, b Axillary leaf fascicles, b<sub>1</sub> A leaf of fascicle, c Cauline leaves, d Floral leaves, e Bracteole, f Hermaphrodite flower



**Fig. 10:** *T. longicaulis* subsp. *chaubardii* var. *chaubardii* (ESSE 11093); a. Calyx, a<sub>1</sub>. Calyx hairs, a<sub>2</sub> Calyx inside, b. Corolla, b<sub>1</sub>. Corolla inside, pistil, stamens, c. Corolla inside of male sterile flower, d. Nutlets

## DISCUSSION

As a result of our investigations we found four species and five taxa of *Thymus* growing in Eskisehir: *T. sibthorpii* Bentham, *T. sipyleus* Boiss., *T. leucostomus* Hausskn.&Velen var. *argillaceus* Jalas (Endemic), *T. longicaulis* C. Presl subsp. *longicaulis* var. *subisophyllus* (Borbás) Jalas, subsp. *chaubardii* (Boiss.& Heldr. ex Reichb. fil) Jalas var. *chaubardii*

According to our morphological findings, height of stems and hair types, dimensions and shapes of leaves, texture of leaves-fleshy or not-, properties of veins, frequency of sterile creeping shoots; shape of floral leaves, inflorescens, shape of bracteols and their position to flower stalk, calyx and their teeth shapes are important differentiative characters to determine the species. *T. sipyleus* has the shortest stem; *T. sibthorpii* has the longest stem and is characterized by the large leaves. Inflorescence of *T. sipyleus* is capitate and other species' inflorescence is capitate or interrupted. We observed that *T. longicaulis* has more frequent sterile creeping shoots. Because of the morphological similarities the definition of diagnostic characters has difficulties. This situation is in general accordance with previous reports stating taxonomic problems of this genus (16-19).

*T. sibthorpii* is described in the Flora of Turkey (4) as a plant having no basal and axillary leaf fascicles. But in this study the specimens have both dense axillary leaf fascicle and infrequent basal leaf fascicle. Basal leaf fascicles were not observed as diagnostic character in our study, which is not in agreement with finding in the Flora of Turkey.

In the Flora of Turkey *T. sipyleus* is represented by 2 subspecies and 2 varieties. However, we were not able to establish infraspecific grouping, since descriptive characters stated in the Flora of Turkey such as leaves and veins, inflorescens and the number of flowers, etc. are in accordance. Such variations are not extra ordinary for this species. Jalas described a species from Ilgaz Mountain (Kastamonu) as a variant that shows an intermediate position in grouping subspecies. We therefore propose that further investigations have to be perform on the taxonomy of this species.

Leaves varying from dense hairy to hairless were observed among the samples *T. sibthorpii* and *T. longicaulis* subsp. *longicaulis* var. *subisophyllus* collected in the same localities. Such variations are usually seen in *Thymus* genus. In the literatures (19) these variations have been noticed to lead different identifications in *T. sibthorpii*.

Besides the samples of *T. longicaulis* var. *subisophyllus* exhibiting hairness variations, the samples with different scent (lavender or thyme) were seen in the same

populations. On the basis of literature data, *Thymus* is known to be rich in chemotypes (20-23).

All the specimens studied are ginodioecious. In fact sexual dimorphism is common property for Labiatae Family (4,24-25). In our specimens, male-sterile flowers has smaller corollas then the hermaphrodite ones and the corolla has white color, in which the sterile stamens are hidden.

In Flora of Turkey it has been represented that 2 taxa of genus *Thymus* grow in Eskişehir. However, in this study we have stated 5 taxa consisted of *T. sibthorpii*, *T. sipyleus*,

*T. leucostomus*, *T. longicaulis* subsp. *longicaulis* var. *subisophyllus*, *T. longicaulis* subsp. *chaubardii* var. *chaubardii* in Eskişehir.

*T. longicaulis* subsp. *chaubardii* is a new record for square B3 and subsp. *longicaulis* var. *subisophyllus* and *T. sipyleus* are also new records for Eskişehir. *T. leucostomus* var. *argillaceus* is the most widespread species in this area.

In this study descriptions of the taxa have been defined more detailed than those in Flora of Turkey and also lacking the knowledge on the properties fruit and corolla have been completed. On the other hand, all detailed figures which help to define the taxa have been given first time in this study. Our findings about *T. sibthorpii* and *T. sipyleus* are contradict the findings of Jalas as stated above. These results have achieved the need of more systematic studies using more samples at least for these two species.

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