

## **Morphological characteristics of exported taxa as Oregano from Turkey I: *Origanum***

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**Abstract:** Oregano is a collective name of a group of taxa have been used as spice and known as Turkish “Kekik”. Different genera and species of the family Labiatae containing timol and carvacrol are being used as oregano. It is determined that 9 taxa are being exported as oregano. They are: *Origanum minutiflorum* O. Schwarz & P.H. Davis, *O. majorana* L., *O. onites* L., *O. syriacum* L. ssp. *bevanii* (Holmes) Greuter & Burdet, *O. vulgare* L. ssp. *hirtum* (Link) Ietsw., *Satureja thymbra* L., *S. cuneifolia* Ten., *Coridothymus capitatus* (L.) Rchb.f., *Thymbra spicata* L. ssp. *spicata*.

In this paper outer and inner morphological characteristics of exported only *Origanum* taxa are given with its description, illustration and distribution.

**Key words:** *Origanum*, morphology, anatomy, oregano, Turkey

### **Introduction**

According to State Institute of Statistics (DIE) one of the most collected plants due to export in Turkey is oregano. Oregano is a collective name of a group of taxa have been used as spice and known as Turkish “Kekik”. Different genera and species of the family *Labiatae* containing timol and carvacrol are being used as oregano. Turkey is exported the highest oregano amounts and value in the world with 14 million \$ and 9 000 tonnes approximately (DIE 2003).

Oregano has been used in Anatolia since the 7th century BC (Kıtıkı 1997). It is mainly used as spice, however aerial parts have been used also as medicinal treatment such as cardiovascular diseases enteropathy, asthma, cold, rheumatism, arthralgia, dyspepsia, headache, toothache,

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bites, as neurotonic, stomachic, diuretic, antiseptic, stimulant, carminative, diyaphoretic, sedative, anthelmintic and expectorant (Baytop T 1984; Baytop A. 1991; Tabata et al 1988, 1993; Yeşilada et al 1995; Sezik et al 1992).

**Table 1.** Natural *Origanum* grown in Turkey (e: endemic)

|                                       |  |
|---------------------------------------|--|
| <b>Section <i>Amaracus</i></b>        |  |
| 1. e                                  | <i>O. boissieri</i> Ietsw. (S Turkey, rare)  |
| 2. e                                  | <i>O. saccatum</i> P.H.Davis (S Turkey, rare)  |
| 3. e                                  | <i>O. solymicum</i> P.H.Davis (SW Turkey, rare)  |
| <b>Section <i>Anatolicon</i></b>      |  |
| 4. e                                  | <i>O. hypericifolium</i> O.Schwarz & P.H.Davis (SW Turkey, rare)   |
| 5.                                    | <i>O. sipyleum</i> L. (W, C & S Turkey)  |
| <b>Section <i>Brevifilamentum</i></b> |  |
| 6.                                    | <i>O. rotundifolium</i> Boiss. (NE Turkey)   |
| 7.                                    | <i>O. acutidens</i> (Hand.-Mazz.) Ietsw. (E Turkey)  |
| 8. e                                  | <i>O. munzurensis</i> Kit Tan & Sorger (E Turkey, only known from the type gathering)  |
| 9. e                                  | <i>O. haussknechtii</i> Boiss. (E Turkey, rare)  |
| 10.                                   | <i>O. bargyli</i> Mouterde (S Turkey, very rare)   |
| 11. e                                 | <i>O. brevidens</i> (Bornm.) Dinsm. (S Turkey, only known from the type gathering)   |
| 12. e                                 | <i>O. husnucan-baseri</i> H.Duman, Aytac & A.Duran (S Turkey, rare)  |
| 13. e                                 | <i>O. leptocladum</i> Boiss. (S Turkey, rare)  |
| <b>Section <i>Longitubus</i></b>      |  |
| 14. e                                 | <i>O. amanum</i> Post (S Turkey)   |
| <b>Section <i>Chilocalyx</i></b>      |  |
| 15. e                                 | <i>O. bilgeri</i> P. H.Davis (S Turkey, very rare)   |
| 16. e                                 | <i>O. vogelii</i> Greuter & Burdet (S Turkey, rare)  |
| 17. e                                 | <i>O. minutiflorum</i> O.Schwarz & P.H.Davis (SW Turkey, rare)   |
| <b>Section <i>Majorana</i></b>        |  |
| 18.                                   | <i>O. majorana</i> L. (S Turkey)   |
| 19.                                   | <i>O. onites</i> L. (W & S Turkey)   |
| 20.                                   | <i>O. syriacum</i> L.<br>ssp. <i>bevanii</i> (Holmes) Greuter & Burdet (S Turkey)  |
| <b>Section <i>Origanum</i></b>        |  |
| 21.                                   | <i>O. vulgare</i> L.<br>ssp. <i>gracile</i> (K. Koch) Ietsw. (E Turkey)<br>ssp. <i>hirtum</i> (Link) Ietsw. (NE, W & S Turkey)<br>ssp. <i>viridulum</i> (Martini-Donos) Nyman (N Turkey, rare)<br>ssp. <i>vulgare</i> (N Turkey) |
| <b>Section <i>Prolaticorolla</i></b>  |  |
| 22.                                   | <i>O. laevigatum</i> Boiss. (S Turkey)   |

It is determined that 9 taxa are being exported as oregano. They are: *Origanum minutiflorum* O. Schwarz & P.H. Davis, *O. majorana* L., *O. onites* L., *O. syriacum* L. ssp. *bevanii* (Holmes) Greuter & Burdet, *O. vulgare* L. ssp. *hirtum* (Link) Ietsw., *Satureja thymbra* L., *S. cuneifolia* Ten., *Coridothymus capitatus* (L.) Rchb.f., *Thymbra spicata* L. ssp. *spicata*.

In this paper only outer and inner morphological characteristics of exported *Origanum* taxa marked with on the list have been presented with their vernacular name, local usage, distribution in Turkey, conservation status. In Turkey the genus *Origanum* represented by 25 taxa and 13 of them are endemic (Table 1) (Ietswaart 1980; Davis 1982; Davis et al. 1988; Güner et al. 2000; Özhatay and Kültür 2006; Govaertes 2003). Endemic or rare taxa also have a very limited usage in their locality and are sold in the open markets.

## Materials and methods

Flowering and fruiting specimens are collected in Adana, Antalya, Balıkesir, Burdur, Çanakkale, Hatay, Isparta, İzmir, Kırklareli, Malatya, Mersin, Muğla, Van and Yalova provinces during June-September in 2001-2004 period and kept in the Herbarium of Istanbul University Faculty of Pharmacy (ISTE).

ADA, AEF, ANK, EGE, ESSE, GAZI, HUB, ISTE, ISTF, IZEF, MARA, MARE, MUFE, VANF and İnönü University herbaria are visited and the taxa exported and used as oregano in Turkey are investigated in detail. Oregano specimens collected and fixed in 70% ethanol since 1996 are the material of the anatomical part which are housed in ISTE.

Morphological drawings are made by Narin Sadıkoğlu with aid of Olympus SZH10 stereomicroscope. Anatomical drawings are made by Leitz SM-LUX binocular microscope with Leitz Weitzler drawing tube and photographs are taken by Olympus BH2 trinocular photomicroscope.

Anatomical sections are taken by hand from the stems and the leaves of the plants. Sartur reactive is used in stems for examining the preparations (Çelebioğlu and Baytop 1949). Leaves are cleared with 15% sodium hypochlorite for 15 minutes. Sections are stained in 1% safranin and mounted in chloral hydrate:glycerol:water (8:2:1). For transverse sections,

leaves are placed in Jeffrey's solution (10% aqueous nitric acid and 10% aqueous chromic acid [1:1]) for 1 week at room temperature until the epidermis began to separate (Berlyn and Miksch 1976). Segments of epidermis with the attached outermost cell layer of cortical parenchyma were collected and washed in water and tissue is mounted.

Stomata amount per mm<sup>2</sup> and stomata index both upper and lower surfaces for the formula of  $SI = (\text{Stomata amount} / \text{Epiderm cell} + \text{Stomata amount}) \times 100$  are established. Averages for every count are established for 10 specimens from 10 plants then 10 views each of them. Palisade ratio and areoles per mm<sup>2</sup> are also established in the preparations of powdered oregano (Şener et al. 1985).

## Results

According to the authors' field observations, the exported *Origanum* taxa are distributed in West, South and Western North of Turkey. They are used as spice, herbal tea and remedies in the collecting areas and usages of each taxa are listed in Table 2.

**Table 2.** *Origanum* exported as Oregano

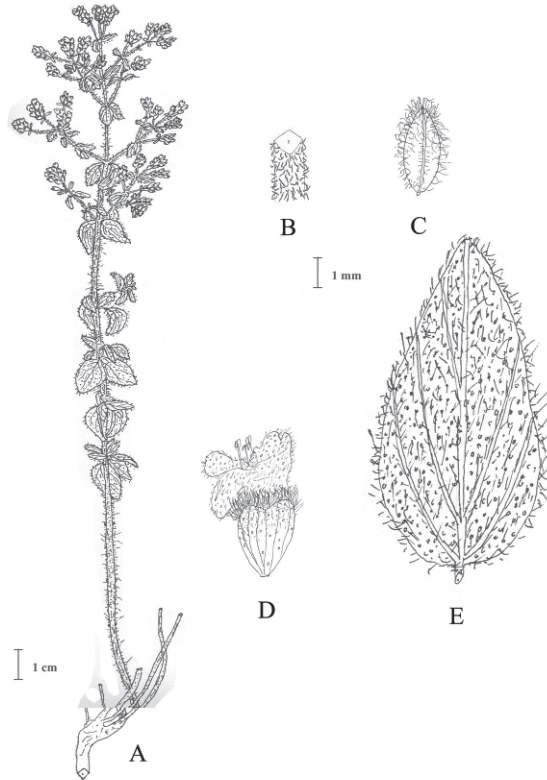
| SCIENTIFIC NAME                              | VERNACULAR NAME (LOCALITY)   | LOCAL USAGE  |
|--|--|--|
| <i>Origanum minutiflorum</i>                 | Toka kekik, Toğka kekiği, eşek kekiği, yayla kekiği (Isparta-Sütçüler)                               | Analgesic, cold, rheumatism, spice, tea  |
| <i>Origanum majorana</i>                     | Beyaz kekik, mercanköşk (Antalya), yağ kekiği (Isparta)  | Analgesic, sedative, asthma, rheumatism, bronchitis, hypertensive, spice, tea, essential oil     |
| <i>Origanum onites</i>                       | Taş kekik, eşek kekiği (Isparta-Sütçüler), bilyalı kekik (Antalya, Çanakkale, Hatay, Isparta, İzmir) | Dermatosis, rheumatism, gynecopathy, cold, stomach ache, anthelmintic, spice, tea, essential oil |
| <i>Origanum syriacum</i> ssp. <i>bevanii</i> | Dağ kekiği, yaban kekik (Hatay), at kekiği (Hatay-Dörtüol)   | Spice, tea.  |
| <i>Origanum vulgare</i> ssp. <i>hirtum</i>   | Karakekik, çorba kekiği (Balıkesir, Çanakkale), çam kekiği (Çanakkale-Küçükkuşu)                     | Digestive, rheumatism, cold, stomach ache, spice, tea.   |

**Dichotomic key for exported *Origanum* taxa based on morphological characteristics**

1. Calyces with 5 (sub)equal teeth **5. *vulgare* ssp. *hirtum***
1. Calyces 2- or 1-lipped
  2. Lower lip of calyx present, calyx 2-lipped, tubular; upper lip often with 3 teeth or lobes, lower lip with 2 small teeth or lobes **1. *minutiflorum***
  2. Lower lip of calyx absent, calyx 1-lipped, bract-like; upper lip subentire
    3. Spicules arranged in corymbiform inflorescence; leaves often serrate or serrulate **3. *onites***
    3. Spicules arranged in paniculate inflorescence; leaves usually entire
      4. Stems and leaves tomentellous (hairs c. 0.3 mm); leaves obtus, veins not raised beneath **2. *majorana***
      4. Stems and leaves hirsute (hairs c. 1 mm); leaves acute, veins usually raised beneath **4. *syriacum* ssp. *bevanii***

## Morphological Characteristics of *Origanum* Taxa Exported as *Origanum*

### 1. *O. minutiflorum* O.Schwarz & P.H.Davis [Sect. *Chilocalyx* (Briq.) Ietsw.]



**Figure 1.** *O. minutiflorum* (ISTE 47686). A. general view, B. stems, C. bracts, D. flower, E. leaves

Perennial herbs to 35 cm, hirtello-pubescent. Branches to 10 pairs per stem, 4 cm long. Leaves petiolate to subsessile (petiole to 6 mm), ovate or elliptic, 3-16x1-12 mm,  $\pm$  acute. Spicules very small (c. 2-8x3 mm), erect. Bracts herbaceous, greyish, hairy, ovate or elliptic, 1-3x0.5-1.5 mm,  $\pm$  obtuse. Verticillasters 2-flowered; flowers hermaphrodite, very small. Calyx c. 2 mm; upper and lower lips often with small lobes. Corollas white, 2.5-4 mm with 2-lipped. Stamens subequal, straight,  $\pm$  included in corolla. Styles up to 6 mm long. Nutlets small, brownish, ovoid (Fig.1).

**Flowering period:** July- August

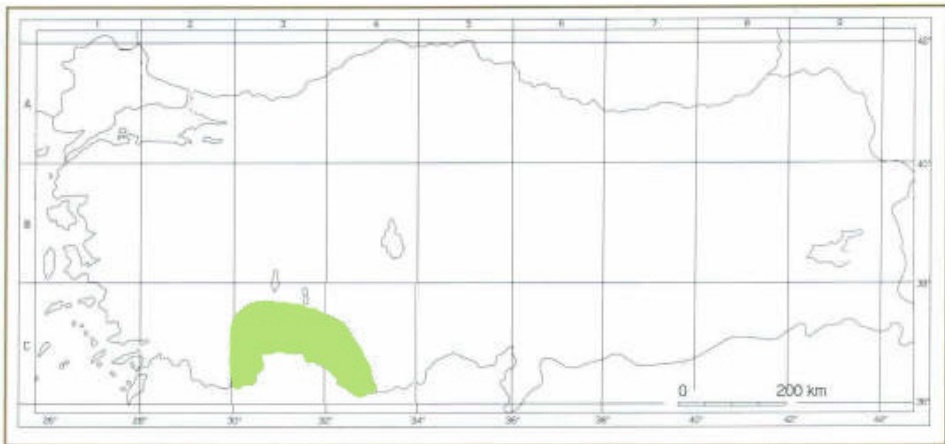
**Habitat:** Rocky limestone slopes, 900-1800 m.

**Phytogeographic region:** Endemic. East Mediterranean element.

**Type:** [Turkey C3] Antalya: Kemer (Lycia), Tahtalı Dağ (ancient Solyma), by Çukur Yayla, above Kemer, c. 1000 m, on rocky limestone slopes with *Ballota cristata*, 15.viii.1947, P.H. Davis 14185 (holo. K, iso. E, G, W).

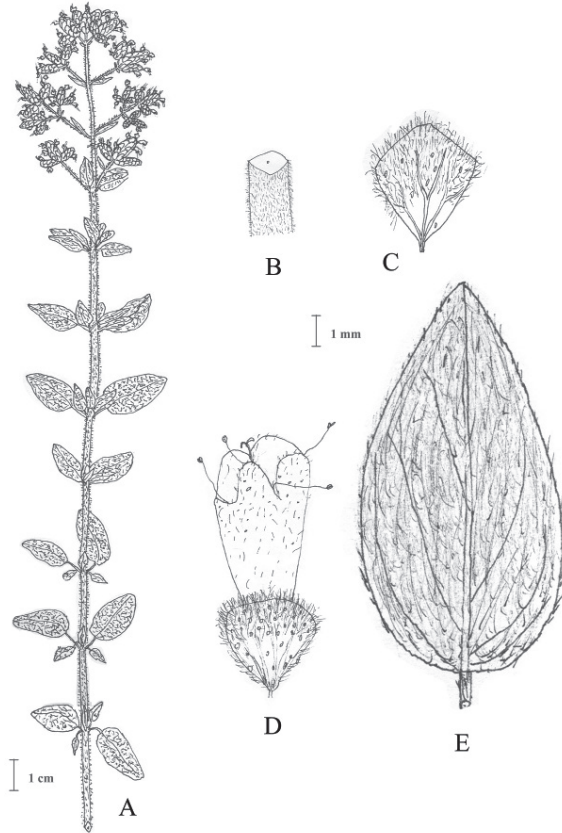
**Distribution in Turkey:** Endemic. SW Anatolia; rare (Map 1).

**Conservation status:** LR(nt) in Turkish Red Data Book (Ekim et al. 2000) but it is in danger according to field observations.



**Map 1.** Distribution of *O. minutiflorum*

2. *O. majorana* L. [Sect. *Majorana* (Miller) Ietsw.]



**Figure 2.** *O. majorana* (ISTE 68334). A. general view, B. stems, C. bracts, D. flower, E. leaves

Perennial herbs to 80 cm, tomentellous. Branches to 10 pairs per stem, to 14 cm. Leaves petiolate to subsessile (petiole to 15 mm), roundish, ovate or elliptic, 3-30x2-25 mm, usually obtuse, veins not raised on lower surface. Spicules in paniculate inflorescence, c. 3-20x3 mm, erect. Bracts enclosing calyx marginally, herbaceous, whitish or greyish, hairy, ovate, elliptic or  $\pm$  rhombic, usually obtuse and entire, 2-4x1-3 mm. Verticillasters 2-flowered; flowers hermaphrodite, very small. Calyx 1-lipped, flattened, bractlike, 2-3.5 mm. Corolla white, 3-7 mm, flattened. Stamens unequal, shortly exserted from corolla. Styles up to 9 mm long. Nutlets small, brownish, ovoid (Fig. 2).



**Flowering period:** May-September

**Habitat:** Dry slopes and rocky places, sometimes in partial shade, 30-1500 m.

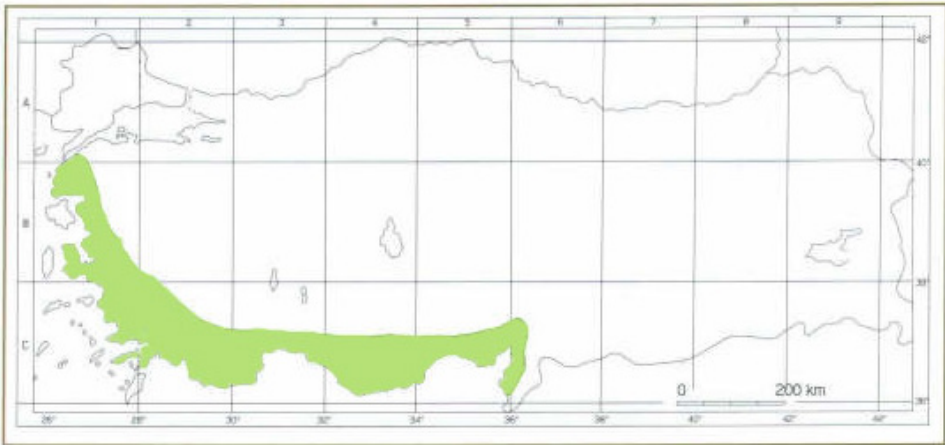
**Phytogeographic region:** East Mediterranean element.

**General distribution:** Cyprus, Turkey

**Type:** Described without indication of province (Hb. Linn. 304/3, photo!).

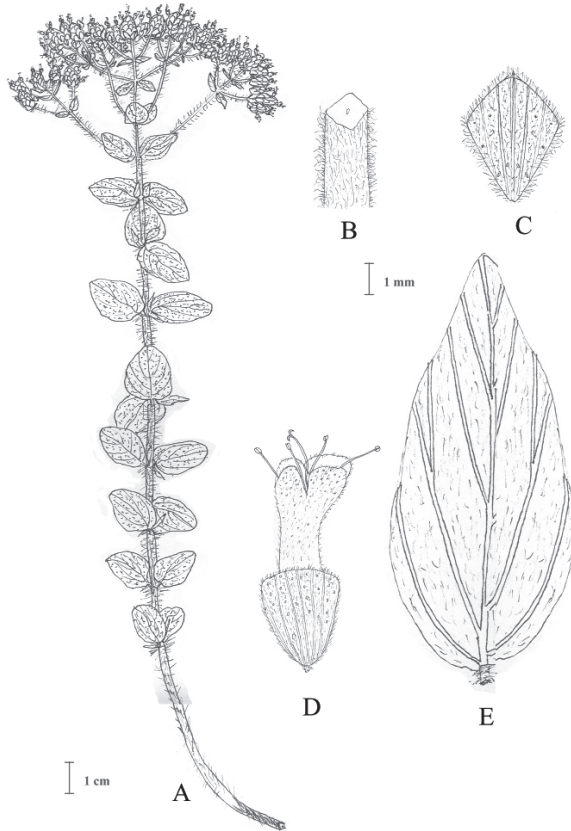
**Distribution in Turkey:** NW, W and S Anatolia (Map 2).

**Conservation status:** Rare, vulnerable for collecting.



**Map 2.** Distribution of *O. majorana* in Turkey

3. *O. onites* L. [Sect. *Majorana* (Miller) Ietsw.]



**Figure 3.** *O. onites* (ISTE 44842). A. general view, B. stems, C. bracts, D. flower, E. leaves

Perennial herbs to 65 cm, hirsute. Branches to 10 pairs per stem, to 13 cm. Leaves petiolate to subsessile (petiole to 6 mm), cordate, ovate or elliptic, 3-22x2-19 mm, ± acute or acuminate, remotely serrulate or entire, veins ± raised on lower surface. Spicules in corymbiform inflorescence, c. 3-17x4 mm, erect. Bracts enclosing calyx marginally, herbaceous, greenish, hairy, obovate or elliptic, 2-5x1.5-4 mm obtuse to acuminate, entire or denticulate. Verticillasters 2-flowered; flowers hermaphrodite, very small. Calyx 1-lipped, flattened, bractlike, 2-3 mm. Corolla white, 3-7 mm, flattened. Stamens unequal, shortly exserted from corolla. Styles up to 10 mm long. Nutlets small, brownish, ovoid (Fig. 3).

**Flowering period:** April-August

**Habitat:** Stony hills and rocky slopes, usually on limestone, sometimes in partial shade, s.l.-1500 m.

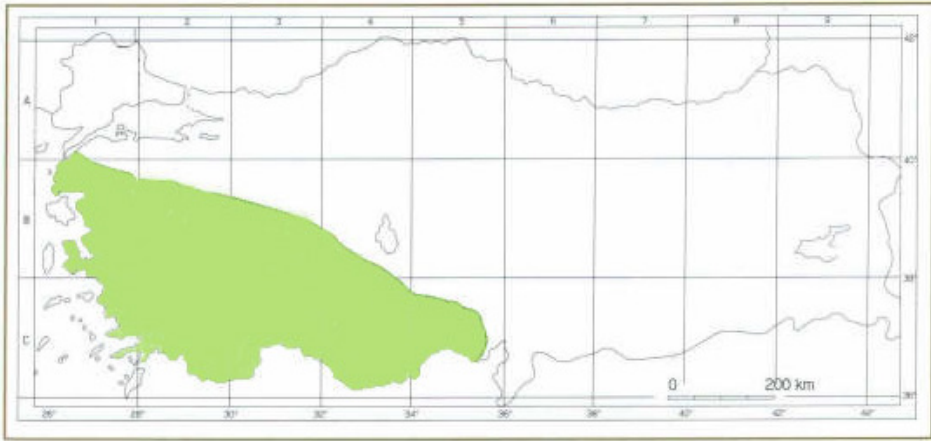
**Phytogeographic region:** East Mediterranean element.

**General distribution:** Greece, Italy, Turkey

**Type:** Described from Syracuse, Sicily (Hb. Linn. 743/11, photo!).

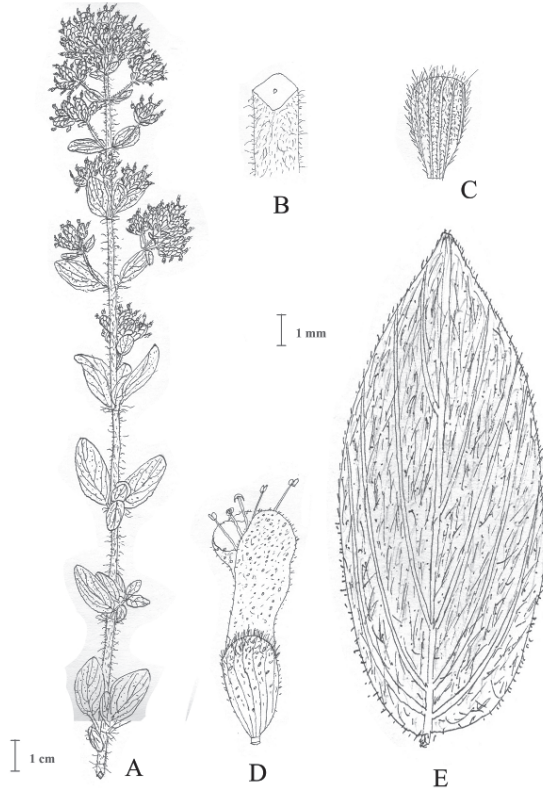
**Distribution in Turkey:** W and S Anatolia (Map 3).

**Conservation status:** Cultivating.



**Map.3:** Distribution of *O. onites* in Turkey

**4. *Origanum syriacum* L. ssp. *bevanii* (Holmes) Greuter & Burdet  
[Sect. *Majorana* (Miller) Ietsw.]**



**Figure 4.** *O. syriacum* ssp. *bevanii* (ISTE 81703). A. general view, B. stems, C. bracts, D. flower, E. leaves

Perennial herbs to 90 cm, hirsute-tomentose. Branches to 10 pairs per stem, to 10 cm. Leaves petiolate to subsessile (petiole to 8 mm), ± ovate, 5-35x4-23 mm, acute or obtuse, entire or remotely serrulate or crenulate, veins raised on lower surface. Spicules in panicle inflorescence, c. 5-25x4 mm, erect. Bracts enclosing calyx marginally, herbaceous, greenish or greyish, hairy, obovate or ± elliptic, 2-5x1.5-3.5 mm, acute or obtuse, entire or denticulate. Verticillasters 2-flowered; flowers hermaphrodite, very small. Calyx 1-lipped, flattened, bractlike, 2.5 mm. Corolla white, 4.5-7.5 mm, flattened. Stamens unequal, shortly exserted from corolla. Styles up to 9 mm long. Nutlets small, brownish, ovoid (Fig. 4).

**Flowering period:** May-October

**Habitat:** Calcareous rocks and slopes, often in partial shade, 200-2700 m.

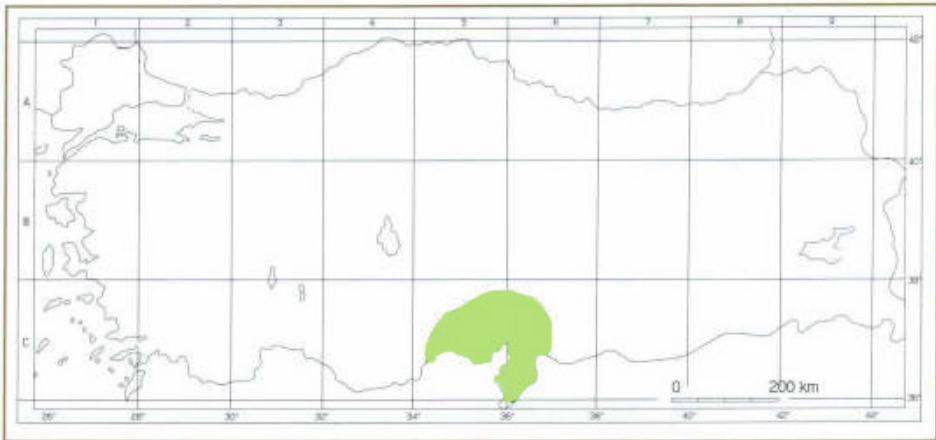
**Phytogeographic region:** East Mediterranean element.

**General distribution:** Cyprus, Lebanon, Syria, Turkey

**Type:** Cyprus, prope Lapitham (Lapithos), 10.vii.1913, W Bevan (holo. K, photo).

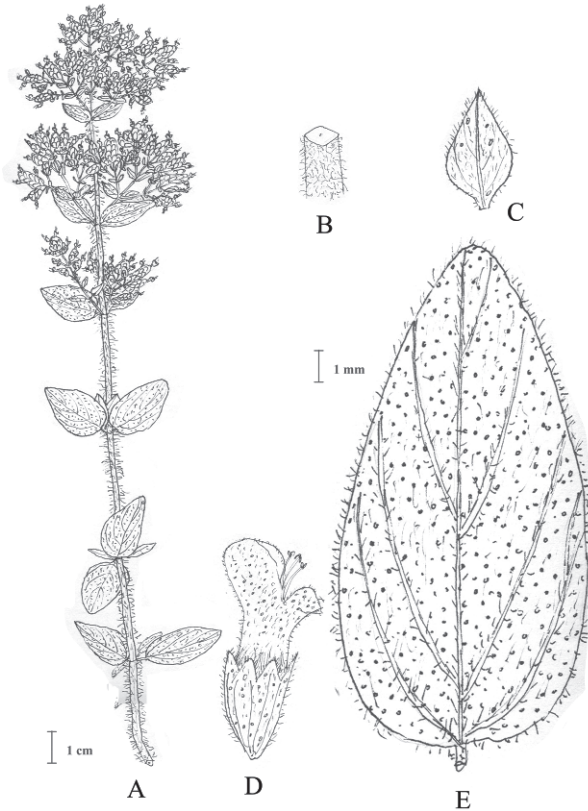
**Distribution in Turkey:** E Mediterranea (Map 4).

**Conservation status:** Collecting but cultivating.



**Map 4.** Distribution of *O. syriacum* ssp. *bevanii* in Turkey

5. *O. vulgare* L. ssp. *hirtum* (Link) Ietsw. [Sect. *Origanum*]



**Figure 5.** *O. vulgare* ssp. *hirtum* (ISTE 20761). A. general view, B. stems, C. bracts, D. flower, E. leaves

Perennial herbs to 100 cm, adpressed-pilose, densely hirsute. Branches to 12 pairs per stem, to 25 cm. Leaves petiolate or sessile (petiole to 20 mm), ovate, elliptic or rounded, 6-40x5-30 mm, acute or obtuse, conspicuously glandular-punctate. Spicules ovoid, 3-30x2-8 mm. Bracts obovate or elliptic, 2-10x1-7 mm, acute or  $\pm$  acuminate, herbaceous, hirsute, green, sometimes slightly purple. Verticillasters 2-flowered; flowers hermaphrodite or gynodioecious, small to medium sized. Calyx  $\pm$  5-toothed, 2-4 mm. Corolla white, 3-10 mm. Stamens unequal, straight, shortly exerted from corolla. Styles up to 13 mm long. Nutlets small, brownish, ovoid (Fig. 5).

**Flowering period:** May-October

**Habitat:** Dry hills and rocky slopes, on calcareous and non-calcareous soils, often in partial shade of coniferous or mixed woods, macchie, s.l.-2500 m.

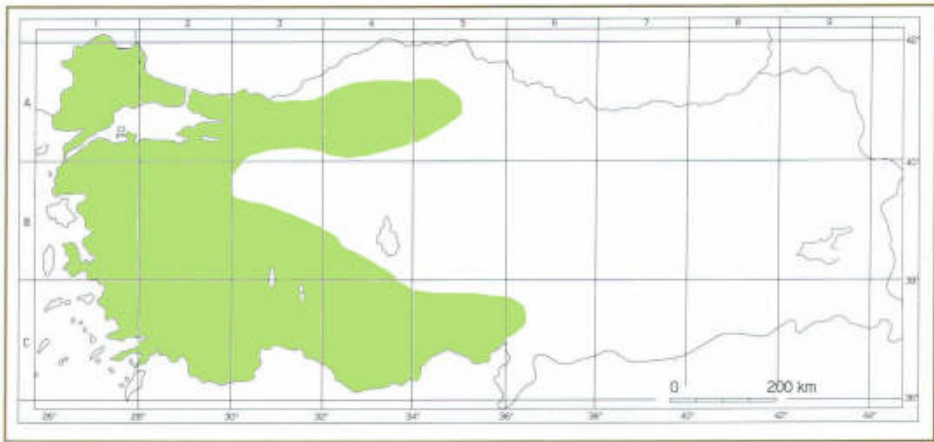
**Phytogeographic region:** East Mediterranean element.

**General distribution:** Albania, Croatia, Cyprus, Bulgaria, Greece, Tunus

**Neotype** (Ietswaart, loc. cit., 1980): [Greece, Macedonia] Peninsula Hagion Oros (Ayion Oros), Kerasia, in silva, 25.vi.1891, Sintenis & Bornmüller 848 (G,W).

**Distribution in Turkey:** Turkey-in-Europe, W and S Anatolia (Map 5).

**Conservation status:** Common.



**Map 5.** Distribution of *O. vulgare* ssp. *hirtum* in Turkey

## **Anatomical Characteristics of *Origanum* Taxa Exported as Oregano**

### **Stem Anatomy**

*Origanum* stems are similar to each other by the anatomical characteristics (Fig. 6). General information about stem anatomy is given below and the differences are revealed.

**Epidermis:** Single layer of cells are elongated, oval or isodiametric. The outer walls of the epidermal cells are thicker than the anticlinal walls. An undulate cuticular layer occurs on it. Various type of glandular and non-glandular hairs are observed. Glands are one celled stalk and a secretory head with one cell, sunken and Labiatae type which is sessile and has 8 celled head. Non-glandular hairs are simple, 1-6 celled, 1 celled ones are prickle hair. Crystals are densely observed at the apex of the cells.

**Cortex:** Below the epidermis, collenchyma tissue occurs which was 4-9 layered on the corners, and 2-5 layered between the corners. There is parenchymatous tissue which has crashed and damaged somewhere with a few layered cells below the lamellar collenchyma. Endodermis is the layer of the cortex and usually has single sometimes 2-layered cells, in a continuous ring. The cells are big, regular walled, and elongated, rarely square. Cambium is indistinct or crushed.

**Vascular region:** There are 4 big vascular bundles on the corners with sclerenchymatous tissue. Phloem 2-7 layered, usually has crashed cells in a discontinuous ring. Sclerenchymatous tissue which has 1-5 layered, flat or round cells, surrounded vascular cylinder by a continuous ring at the phloem pole. On the xylem tracheas are oval or roundish, tracheids are irregular. Single layered or rarely 2 layered pith rays are occur in the xylem tissue. Pith is made of big and roundish parenchymatous cells and contains starch.

### **Differences about stem anatomy of *Origanum* taxa**

In *O.minutiflorum*, glands have one celled head and stalk, 5-6 layered collenchyma under the epidermis, 4-5 layered discontinuous phloem above 1-5 layered continuous sclerenchyma ring.



*O. majorana*, hairs on epidermis are long and dense. In some hairs, crystals are observed sparsely. Glands have one celled head, 1-2 celled stalk. Phloem 3-5 layered in a discontinuous ring and 1-3 layered continuous sclerenchyma ring is present above it.

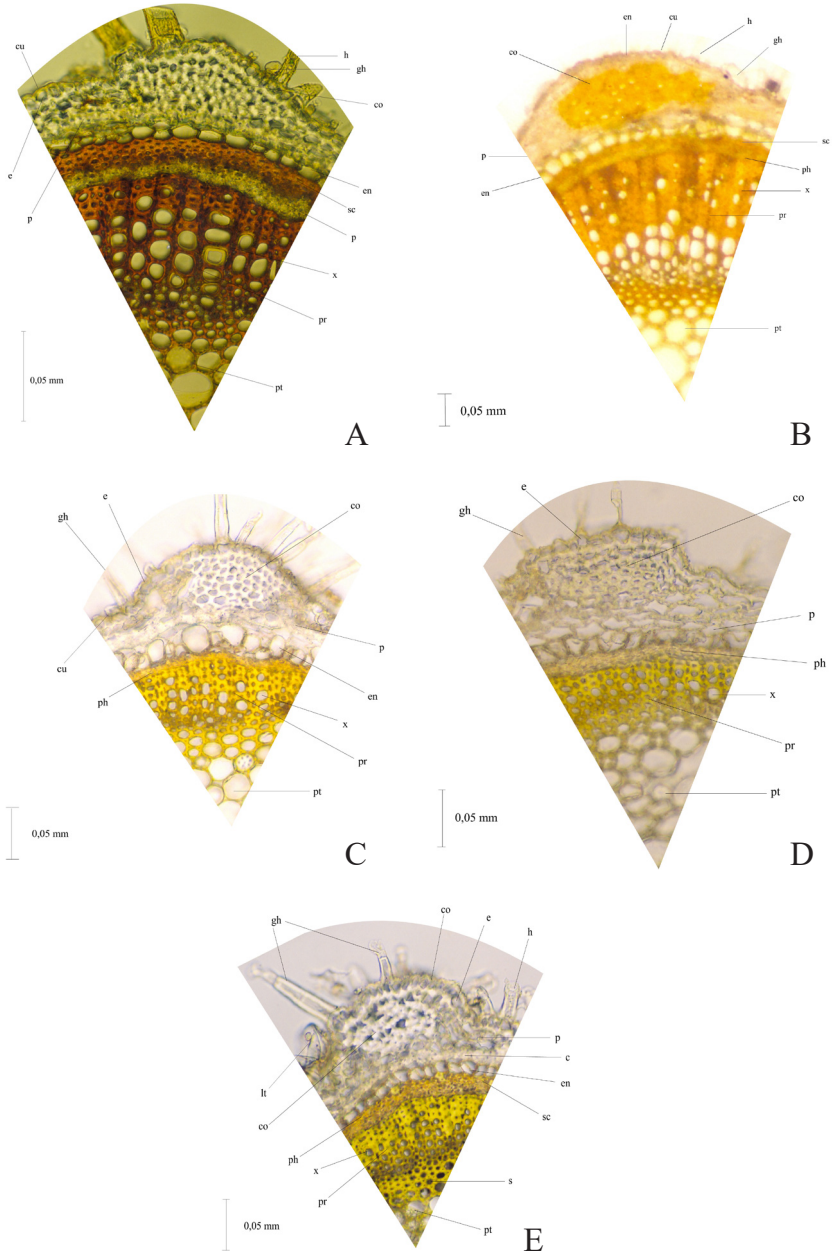
Cuticular peg is observed in *O. onites* hairs. Cuticle is very undulate. Many glands have one celled head and one or multi celled stalk. A thick collenchyma tissue is occur under epiderm 4-9 layered at the corners and 2-5 layered between corners. Endodermis cells are usually quadrangular. There are 2-3 layered discontinuous phloem above 1-2 layered continuous sclerenchyma ring.

In *O. syriacum*, epidermis cells are minute. Glands have one celled head and one or multi celled stalk. Endodermis single layered, usually has crushed cells. Phloem 5-7 layered in a discontinuous ring. There is no sclerenchyma on it.

*O. vulgare* has an undulate cuticle. Hairs on the epidermis are sparse. Glands have one celled head and stalk. Phloem 2-8 layered in a discontinuous ring. There is single layered discontinuous sclerenchyma ring on it. Xylem is thin layered. Pith and pith rays densely contain starch. There are evident cuticular thickenings on the pith.

Abbreviations of the anatomical part are given below:

c cork; co chollenchyma; cu cuticle; e epidermis; en endodermis; gh glandular hair; h hair; hc hair cell; le lower epiderm; lt Labiatae type glandular hair; mv middle vessel; p parenchyma; ph phloem; pp palisade parenchyma; pr pith rays; ps parenchymatous sheath; pt pith; s starch; sc sclerenchyma; sp spongy parenchyma; st stomata; ue upper epiderm; vb vascular bundle; x xylem



**Figure 6.** Cross-sections of *Origanum* stems. A. *O. minutiflorum* (Narin/kekik/046) B. *O. majorana* (Narin/kekik/128) C. *Origanum onites* (Narin/kekik/059) D. *Origanum syriacum* L. ssp. *bevanii* (Narin/kekik/129) E. *O. vulgare* L. ssp. *hirtum* (Narin/kekik/082)

## Leaf Anatomy

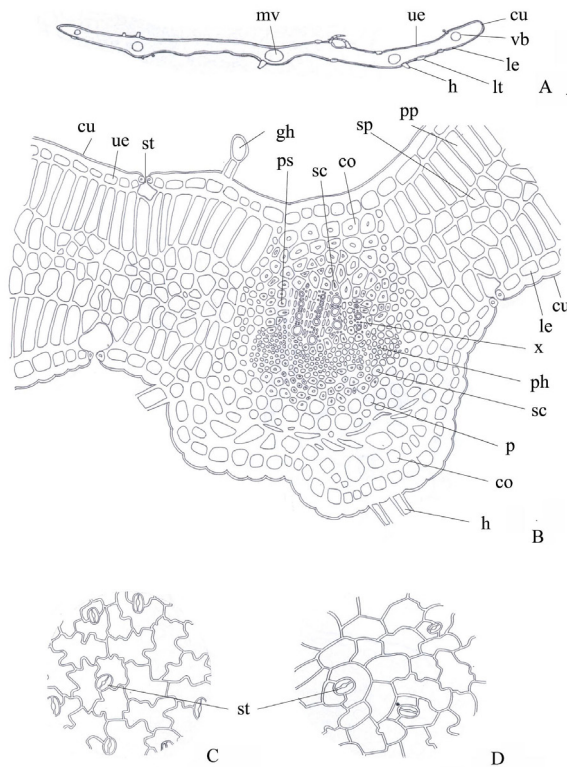
**Epidermis:** Single layer of cells are elongated or isodiametric. There is a thick cuticular layer on it and the cells of the upper epidermis are bigger than the lower surface. On the superficial section, walls of the epidermis cells are undulate, that upper ones are slightly, lowers are prominent. Hairs are simple, 1-6(-7) celled. Glandular hairs are 2 types of having stalk or not. First is have a secretory head with one cell and 1-3 celled stalk. The other is *Labiatae* type 8 celled or rarely 12-16 celled, sunken, occur in deep hollows both on the upper and the lower epidermis. Stomata are present on both upper and lower epidermis (amphistomatic), and denser on the lower surface. On the cross-section, guard cells are upper than the epidermis cells (higromorf stomata). They are oval and the subsidiary cells -one of them is smaller then the other (*Labiatae* type) - are 2 (diacytic), rarely 3 (anisocytic), on the lower surface are much bigger.

**Parenchyma tissue:** Under the upper and lower epidermis, 1-2 layered palisade parenchyma including many chloroplast and 2-5 layered spongy parenchyma between them (isobilateral leaf) are occur.

**Vascular cylinder:** Upper and lower parts of the veins of the old leaves and the most part from the young ones are been surrounded by sclerenchymatous tissue. After the lower epidermis, 1-6 layered corner collenchyma occurs. Xylem found on the upper side and, phloem is on the lower. (bicollateral vascular bundle). Thin walled parenchymatic cells between tracheary elements are on the xylem. A parenchymatous sheath covers the bundle. Vascular bundles are reduced. Under the upper epidermis, 1-6 layered collenchyma occurs after the crashed parenchyma and sclerenchyma cells.

**1. *O. minutiflorum* O.Schwarz & P.H.Davis**

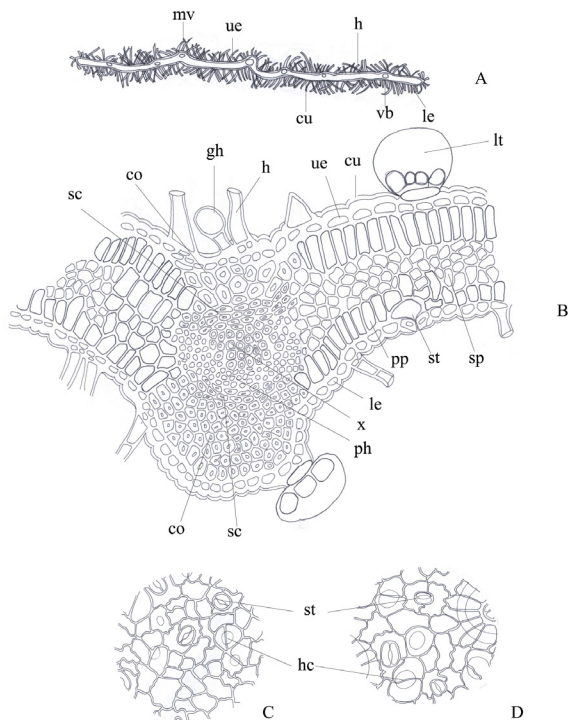
Labiatae type glandular hair per cm<sup>2</sup> is approximately 1200-(1500)-1700 in epidermis. Stomata amount is established per mm<sup>2</sup>: 70-(160)-240 on the lower surface and 60-(80)-130 on the upper one. Subsidiary cells are 2, rarely 3. Stomata index is established 58.60 for the lower surface and 45.19 for the uppers. Palisade parenchyma is single layered, spongy parenchyma is 3-5 layered. Palisade ratio in powdered specimens is established 5.7, areoles per mm<sup>2</sup> is 4.7. Sclerenchymatous tissue is the most part of the midrib. Under the lower epidermis 4-5 layered collenchyma tissue is occur. A parenchymatous sheath is surrounded the bundle. There are crushed parenchyma cells after 2-3 layered collenchyma under the lower epidermis (Fig. 7).



**Figure 7.** *Origanum minutiflorum* (Narin/kekik/046). A. Cross-section of leaf (x60), B. Middle vessel (x450), C. Lower surface of epiderm (x225), D. Upper surface of epiderm (x225)

## 2. *O. majorana* L.

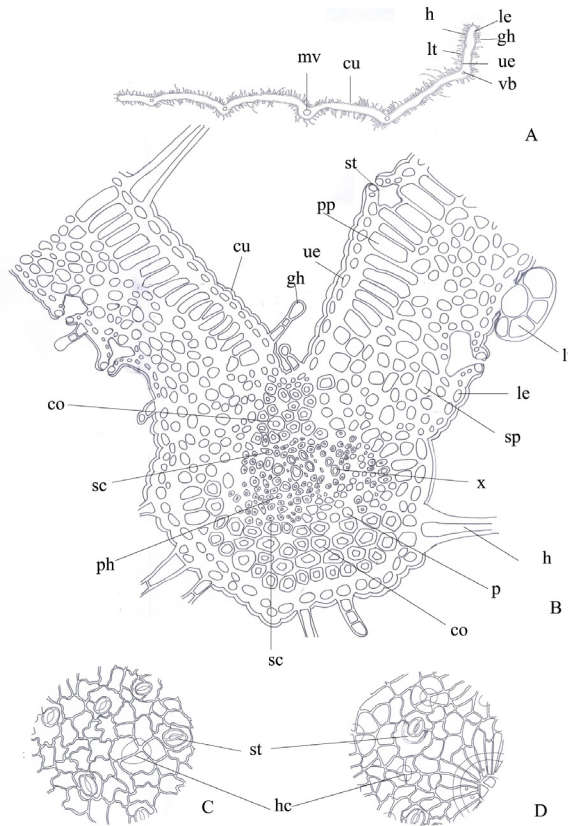
Hairs are densely and long on the epidermis. In some hairs crystals are observed sparsely. Labiatae type glandular hairs are not sunken in palisade parenchyma. *Labiatae* type glandular hairs per cm<sup>2</sup> are established 1000-(1600)-3800 on epidermis. Epidermis cells of the lower surface are smaller than the uppers. Stomata amount is established per mm<sup>2</sup>: 700-(1020)-1200 on the lower surface and 200-(520)-600 on the upper one. Subsidiary cells are 2, rarely 3 which the lower surface are smaller than the uppers. Stomata index is established 88.38 for the lower surface and 79.51 for the uppers. Palisade parenchyma is 1-2 layered, spongy parenchyma is 2-4 layered. Palisade ratio in powdered specimens is established 3.4, areoles per mm<sup>2</sup> is 2.25. Sclerenchymatous tissue is occurred upper and lower part of the midrib. There are 5-6 layered collenchyma after the lower epidermis and 2-3 layered collenchyma after the upper epidermis (Fig. 8).



**Figure 8.** *Origanum majorana* (Narin/kekik/128). A. Cross-section of leaf (x100), B. Middle vessel (x450), C. Lower surface of epidermis (x225), D. Upper surface of epidermis (x225)

**3. *O. onites* L.**

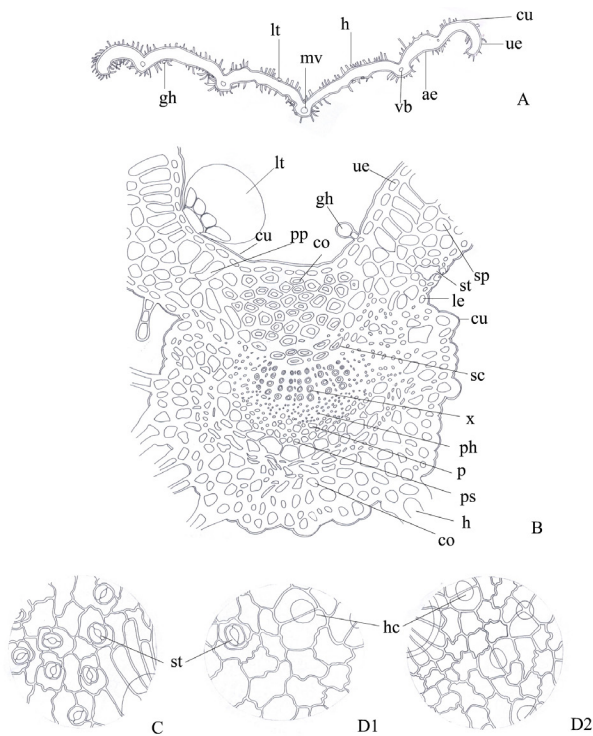
Labiatae type glandular hair per cm<sup>2</sup> is approximately 1000-(1500)-1800 on epidermis. Epidermis cells of the lower surface are smaller than the uppers. Stomata amount is established per mm<sup>2</sup>: 500-(1150)-1700 on the lower surface and 400-(620)-800 on the upper one. Subsidiary cells are 2 (diacytic). Stomata space is more evident. Stomata index is established 89.91 for the lower surface and 82.55 for the uppers. Palisade parenchyma is 1-2 layered, spongy parenchyma is 3-5 layered. Palisade ratio in powdered specimens is established 2.7, areoles per mm<sup>2</sup> is 8.6. There are 3-4 layered collenchyma after the lower epidermis and 4-5 layered collenchyma after the upper epidermis and 2 layered sclerenchyma. Tracheary elements are sparsely and untidy in the xylem (Fig. 9).



**Figure 9.** *Origanum onites* (Narin/kekik/059). A. Cross-section of leaf (x40), B. Middle vessel (x450), C. Lower surface of epidermis (x225), D. Upper surface of epidermis (x225)

#### 4. *Origanum syriacum* L. ssp. *bevanii* (Holmes) Greuter & Burdet

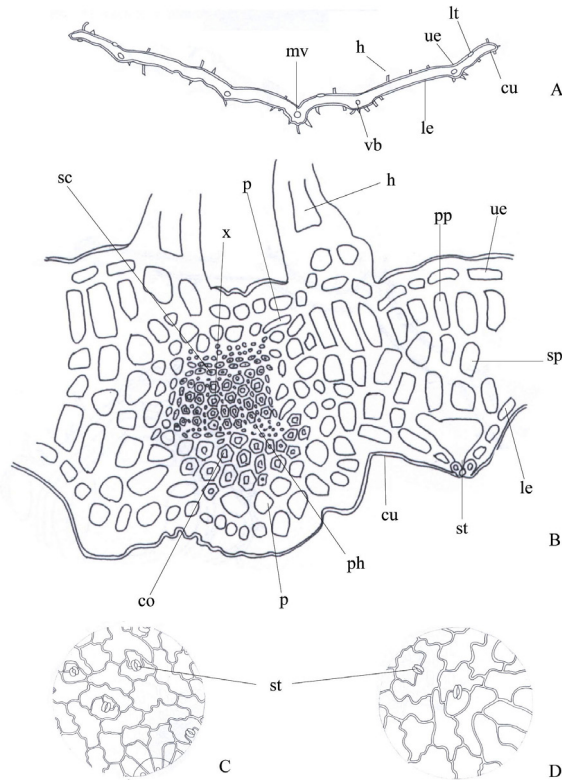
Hairs are 1-5 celled. Labiateae type glandular hair per cm<sup>2</sup> is approximately 400-(1650)-3000 on epidermis. Epidermis cells of the lower surface are smaller than the uppers. Stomata amount is established per mm<sup>2</sup>: 1200-(1840)-4500 on the lower surface and 30-(80)-100 on the upper one. There is no stomata on some specimens, their epidermis cells are smaller. Subsidiary cells are 2 (diacytic). Stomata space is evident. Stomata index is established 95.93 for the lower surface and 51.94 for the uppers. Palisade parenchyma is single layered, spongy parenchyma is 2-3 layered. Palisade ratio in powdered specimens is established 3.5, areoles per mm<sup>2</sup> is 6. There are 2-3 layered collenchyma after the lower epidermis. Tracheary elements are sparsely in the xylem. A parenchymatous sheath is surrounded the bundle. There are 5-6 layered collenchyma after the upper epidermis and sclerenchymatous tissue (Fig. 10).



**Figure 10.** *Origanum syriacum* ssp. *bevanii* (Narin/kekik/129). A. Cross-section of leaf (x50), B. Middle vessel (x450), C. Lower surface of epidermis (x225), D. Upper surface of epidermis (x225)

**5. *O. vulgare* L. ssp. *hirtum* (Link) Ietsw.**

Lower surface of the epidermis cells are less undulate, uppers are undulate walls. Labiatae type glandular hair per cm<sup>2</sup> is approximately 1500-(1700)-2000 on epidermis. Hairs are 1-5 celled. Stomata amount is established per mm<sup>2</sup>: 600-(1400)-2400 on the lower surface and 100-(440)-900 on the upper one. Subsidiary cells are 2 (diacytic). Stomata index is established 96.68 for the lower surface and 91.28 for the uppers. Stomata space is evident. Palisade parenchyma is single layered, spongy parenchyma is 2-3 layered. Spongy parenchyma cells, contain larger spaces. Palisade ratio in powdered specimens is established 3.2, areoles per mm<sup>2</sup> is 7.4. There are 3-4 layered collenchyma after the lower epidermis. There are 1-2 layered collenchyma after the upper epidermis and parenchymatous tissue (Fig. 11).



**Figure 11.** *Origanum vulgare* (Narin/kekik/082)A. Cross-section of leaf (x80), B. Middle vessel (x450), C. Lower surface of epiderm (x225), D. Upper surface of epiderm (x225)



## Discussion

Some morphological differences are observed in *O. majorana* specimens. Spicules lax which are collected from Mersin but compact from Alanya. In *O. syriacum* ssp. *bevanii* morphological differences are observed by seasonal changes. The specimens which are collected in September-October, spicules are capitate in comparison to June and have more dark corolla. In some of *O. vulgare* ssp. *hirtum* specimens collected from Çanakkale much longer spicules are observed. It must be investigated that is it a different taxa or not. DNA analyses must be done on all problematic taxa. The differences of these taxa would be cleared by biosystematical investigations. The differences of morphological characteristics are summarised in the Table 3.

Leaves are isobilateral. In *Origanum* species thick lateral veins are occur along the blade, both side of the midrib. The midrib and the lateral veins are made a deep promontory to the outside. Anatomically, the lateral veins have the same structure with the midrib but the vascular bundles are reduced.

In *O. minutiflorum* subsidiary cells are 2-3, hairs are 1-5 celled straight or curved, granules are evident, walls are thin. In *O. majorana* long and dense hairs are curved, walls are thin, crystals are sparsely, subsidiary cells are smaller on the lower surface. In *O. onites* glandular hairs are more than the others, crystals are long, hairs are 1-7 celled. In *O. syriacum* ssp. *bevanii* long and dense hairs are curved, crystals are present. Stomata amount is rare on the upper surface, it could not be found in some specimens. In *O. vulgare* ssp. *hirtum* hairs are 1-7 celled, sparsely, granules are evident, walls are thick. Prickle hairs are observed more commonly.

**Table 3.** Morphological differences of examined *Origanum* taxa

|                   | <i>O. minutiflorum</i>   | <i>O. majorana</i>  | <i>O. onites</i>   | <i>O. syriacum</i><br>ssp. <i>bevanii</i>   | <i>O. vulgare</i><br>ssp. <i>hirtum</i>                             |
|-------------------|--|---|--|---|---|
| Colour (powdered) | Green  | Whitish green   | Yellowish green  | Greyish green   | Dark green  |
| Hairs             | Hirtello-pubescent   | Tomentellous  | Subpilose, hirsute   | Hirsute-tomentose to pilose   | Hirsute, adpressed-pilose   |
| Leaves            | 3-16x1-12 mm; ovate; obtuse; entire; veins $\pm$ obvious, thin, 2-3 pairs, | 3-35x2-30 mm; ovate, elliptic; obtuse; entire; veins not raised on lower surface, thin, 2-3 pairs | 3-22x2-19 mm; ovate; obtus; serrulate or entire; veins $\pm$ raised on lower surface, thick, 3-4 pairs | 5-35x4-23 mm; ovate; acute or obtuse; entire, serrulate or crenulate; veins raised on lower surface, thick, 2-4 pairs | 2-33x1-30 mm; ovate; obtuse or acute; entire; veins thin, 2-4 pairs |
| Petiole           | 1-2 mm   | 1-5 mm  | 0,1-3(-6)mm  | 0,5-6(-8) mm  | 2-12 mm   |
| Inflorescence     | Paniculate   | Paniculate  | Corymbiform  | Paniculate  | Paniculate  |
| Bracts            | Ovate or elliptic  | Obovate-suborbicular  | Obovate-elliptic   | Obovate or $\pm$ elliptic   | Obovate-elliptic  |
| Calyx             | Campanulate, 2-lipped  | Obovate-suborbicular, 1-lipped  | Obovate, 1-lipped  | Obovate-suborbicular, 1-lipped  | Infundibular-campanulate, 2-lipped                                  |

In *O. syriacum* ssp. *bevanii*, *O. onites* and *O. vulgare* ssp. *hirtum* glandular hair with long stalk are densely present. The longest hair is occur in *O. syriacum* ssp. *bevanii*, *O. majorana* and *O. syriacum* ssp. *bevanii*, the densest hair in *O. majorana* and *O. syriacum* ssp. *bevanii*, the densest glandular hair with stalk in *O. onites*, the densest glandular hair in *O. vulgare* ssp. *hirtum*, the biggest glandular hair in *O. majorana*, the smallest stomata in *O. minutiflorum*, the sparsest stomata amount on the upper surface in *O. syriacum* ssp. *bevanii*, the densest stomata amount on the lower surface in *O. syriacum* ssp. *bevanii*, the biggest stomata and epidermis cells are in *O. vulgare* ssp. *hirtum*. The differences of anatomical characteristics are summarised in the Table 4.

**Table 4.** Anatomical differences of examined *Origanum* taxa

|  | <i>O. minutiflorum</i>               | <i>O. majorana</i>           | <i>O. onites</i>             | <i>O. syriacum</i><br>ssp. <i>bevanii</i> | <i>O. vulgare</i> ssp.<br><i>hirtum</i> |
|--|--------------------------------------|------------------------------|------------------------------|---|---|
| Palisade ratio                                     | 5.7                                  | 3.4                          | 2.7                          | 3.5                                       | 3.2                                     |
| Areoles per mm <sup>2</sup>                        | 4.7                                  | 2.3                          | 8.6                          | 6   | 7.4                                     |
| Stomata amount per mm <sup>2</sup> (lower / upper) | 160/80                               | 1020/520                     | 1150/620                     | 1840/80,0                                 | 1400/440                                |
| Stomata index (lower / upper)                      | 58.60/45.19                          | 88.38/79.51                  | 89.91/82.55                  | 95.93/51.94                               | 96.68/91.28                             |
| Glandular hairs (no stalk) per mm <sup>2</sup>     | 1500                                 | 1600                         | 1650                         | 1700                                      | 2000                                    |
| Subsidiary cells                                   | 2-3                                  | 2-3                          | 2                            | 2   | 2                                       |
| Collenchyma (lower epidermis)                      | 4-5                                  | 5-6                          | 3-4                          | 2-3                                       | 3-4                                     |
| Collenchyma (upper epidermis)                      | 2-3                                  | 2-3                          | 4-5                          | 5-6                                       | 1-2                                     |
| Palisade parenchyma                                | 1-layered                            | 1-2-layered                  | 1-2-layered                  | 1-layered                                 | 1-layered                               |
| Spongy parenchyma                                  | 3-5                                  | 2-4                          | 3-5                          | 2-3                                       | 2-3                                     |
| Hairs  | 1-6(-7)                              | 1-6(-7)                      | 1-6                          | 1-5                                       | 1-5                                     |
| Glandular hairs                                    | Stalk and head with 1 celled         | Head 1, stalk 1-2 celled     | Head 1, stalk 1-multi celled | Head 1, stalk 1-multi celled              | Head 1, stalk 1-multi celled            |
| Sclerenchyma                                       | 5                                    | 1-3                          | 1-2                          | -   | 1                                       |
| Collenchyma (corner)                               | 5-6                                  | 6-9                          | 4-9                          | 5-6                                       | 5-6                                     |
| Collenchyma  | 2-3                                  | 3-4                          | 2-5                          | 3-4                                       | 2(-3)                                   |
| Floem  | 4-5                                  | 3-5                          | 2-3                          | 5-7                                       | 2-8                                     |
| Cuticle (lower / upper)                            | Undulate / smooth, slightly undulate | Undulate / slightly undulate | Undulate / smooth            | Slightly undulate, undulate / undulate    | Slightly undulate / undulate            |
| Epidermis cells (lower / upper)                    | Big / small                          | Small / big                  | Small / big                  | Small / big                               | Big / small                             |

### **Acknowledgements**

This study is supported by The Research Fund of Istanbul University (Project number: T-1115). The authors are grateful to the staff of ADA, AEF, ANK, EGE, ESSE, GAZI, HUB, ISTE, ISTF, IZEF, MARA, MARE, MUFE, VANF and Herbarium of İnönü University herbaria. We are also grateful to Prof. Dr. T. Ekim, Prof. Dr. N. Kırırmer, Prof. Dr. B. Yıldız and MSc. M. Öztekin for supplying literature, MSc. M. Keskin and P. Sadıkođlu for their kindly help.

We thank for their help in field studies to: İ. Nacakçılar, H. M. Ar, A. Datumani, F. Erbaş, Ş. Türüdü, H. Çankırı, H. Kahraman, E. Sözen, F. Yeşil, E. Çınkır, A. Samray and A. Gülbaba from Forestry Administration, A.B. Tınmaz, M. Dođan, M. Atmaca, U. Sakallı, S. Dođan and A. Gökdemir from Agricultural Administration, B. Saruhan (Tamsan), A. Aji (Figsan), E.R. Roditi, Timtaş, E. Pariente (Demar), M. Yakıcı (Ardıç Tarım), F. F. Türkmen (Türkmen Tarım), A. İnan (İnan Tarım), S. Özdemir (Özdrog Yađ, Tic. San.), M. Kara, N. Şentürk, M. Kayacan and M. & M. Berber.

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## Appendix

### Examined specimens ;

#### *Origanum minutiflorum* O.Schwarz & P.H.Davis

**C3 Antalya:** Kemer, Tahtalıdağ, Çukur Yayla-Ağla Y., 1100 m, 23.viii.1978, kalkerli kuzey yamaçlar, *C. libani* ormanı, H. Peşmen 4105, A. Güner (AEF, ANK, ISTE 52612)! Antalya-Tahtalıdağ, Çukur Y., ca. 1000 m, 16.viii.1947, K. Bilger 14185 (AEF)! Kemer, Tahtalı dağ, Çukur Y., 1000 m, 16.viii.1947, P.H. Davis 14185 (ANK)! Çalbalı dağ, Kor çukuru, Feslihen Y., 1800 m, K. Karamanoğlu 15402 (ANK)! Gebiz, Bozburun dağ, Tozlu Çukur Y., P.H. Davis 15509 (ANK)! Tahtalı Da., W side, Yukarı Beycik kö., 2000-2350 m, 17.vii.1984, (EGE 31181)! Çalbalı Da., SW Bakırlı Dağı, 1550-1650 m, 18.vii.1984, (EGE 31182)! Saklıkent, 30.v.1990, G. Tümen (ESSE 8775)! Antalya-Beycik, 2.vi.1989, K.H.C. Başer (ESSE 8979)! Antalya-Altınkaya, Hisar, Çandır-Sarıpınar yolu, 1550 m, 30.x.1981, A. ve T. Baytop (ESSE 9445)! Kemer üstü, Tahtalı da. yolu, 1300 m, yayla, 21.vi.1995, K.H.C. Başer 1057, H. Duman, A. Altıntaş (ESSE 11298)! Finike, Beydağı, Davut gölü da., 2700 m, G. Tümen (ESSE 13030)! Manavgat, Beşkonak, Çaltepe, Bolalan kö., vii.2000, E. Özbilen (ESSE 13120)! Antalya-Altınkaya, Hisarçandır, Sarıçınar yolu, 1550 m, 30.x.1981, A. ve T. Baytop (ISTE 47686)! Çalbalı da., Fesleğen Y. yakını, 1830

m, 4.viii.1980, N. Özhatay, E. Tuzlacı, B. Çubukçu, A. Meriçli (ISTE 45629)! **Isparta:** Sütçüler, Çaldır'dan 15 km orman kesim alanı, 1400 m, 1.ix.1996, dere yatağı, Özçelik 7599 (GAZI)! Dedegöl, Pınargözü (Milli park üzeri), 2600-2800 m, 26.viii.1995, kaya açıkları, Özçelik 7351 (GAZI)! Eğirdir-Konya'ya 50-60 km, Sütçüler Y., 2000 m, G. Tümen (ESSE 9968)! Sütçüler, G. Tümen (ESSE 9979)! Beşkonak, 2.ii.1995, Altes'ten geldi (ESSE 11029)! Sütçüler, Çandır-Söğüt Y., 1120 m, K.H.C. Başer 1138, H. Duman, A. Altıntaş (ESSE 11583)! Sütçüler, Altes, 2.ii.1995, G. Tümen (ESSE 11032)! Yedimehmetler, Yuvalı mevkii, 22.ix.1999, S. Oflaz (ESSE 13054)!, Çandır kö., Söğüt Y. mevkii, 2000 m, 6.ix.1999, S. Oflaz (ESSE 13053)! Sütçüler, Gümü, 10.ix.1999, S. Oflaz (ESSE 13362)! Sütçüler, Beydili, 11.ix.1999, K.H.C. Başer, S. Oflaz (ESSE 13361)! Sütçüler, Beydili-Çimenova, yol kenarı, 11.viii.2001, N. Sadıkoğlu (ISTE 81643)!

### *Origanum majorana* L.

**A1(A): Çanakkale:** Ezine, Çıgırı (Kayacık) kö., köy içi, 490 m, 20.vi.2002, G. Emre (MARE 8366, 8370)! Ezine, Balıklı köyü, 130 m, 14.iv.2002, G. Emre (MARE 8275)! Ezine, Köprübaşı kö., 200 m, 13.iv.2002, G. Emre (MARE 8271)! Çan, v.1995, G. Tümen (ESSE 11373)! *ibid.*, v.1995, F. Tural, G. Tümen (ESSE 10797)! Lapseki -kültür- 3.9.1996, F. Çimen (ESSE 13068)! **B1 Balıkesir:** Kazdağ-Avcılar köyüne 3 km kala, 4.vii.1992, N. Ermin (ESSE 9748)! Akçay, Fener tatil sitesi bahçesi, 7.vii.1991, G. Tümen (ESSE 9322)! NEF bahçesi, 20.viii.1997, G. Tümen (ESSE 12544)! İzmir: Yamanlar da., 10.vi.1995, G. Tümen (ESSE 11854)! **B2 Denizli:** Buldan-Türlübey kö., 28.vi.1995, G. Tümen (ESSE 11421)! İzmir: Kiraz, Sensiler kö., bahçe, x.1992, G. Tümen (ESSE 9869)! **C1 Aydın:** Koçarlı, Dereköy yol yamaçları, 31.iii.2002, E. Sadıkoğlu (MARE 8426)! Kiraz, bahçeden -kültür- 22.ix.1994, G. Tümen (ESSE 10801)! İzmir: Selçuk, Kuşadası, 27.vii.1996, G. Tümen (ESSE 12257)! **Muğla:** Bodrum, Geriş köyü, d.s. -kültür- 14.vi.2001, E. Tuzlacı (MARE 6790)! kent içi, tepecik mahallesi -kültür- 10.vii.1990, E. Tuzlacı (MARE 2646)! **C2 Antalya:** Altes bahçesi, viii.1995, N. Mumcuoğlu (ESSE 11972)! **Aydın:** Çine, 1993, G. Tümen (ESSE 10774)! Çine, Yılanlı da., 16.viii.1989, M. Kırımca (ISTE 59960)! **Denizli:** Sarayköy, Tekke köyü, 7.ix.1997 (MARE 5803)! Acıpayam, 5.ix.1994, G. Tümen (ESSE 10769)! **C3 Antalya:** Akseki, Sadıklar Kö., Geyran yolu, 1000 m, 10.vi.1995, çalılık arası, A. Duran 2658 (GAZI)! Manavgat-Akseki karayolu, Akseki yol ayrımından Akseki'ye doğru 5. km yol kenarları, 6.vi.1980, M. ve N. Tanker, E. Şarer, F. İlisulu 10831 (AEF)! Antalya-Manavgat, Uzunlar Kö., 28.v.1973, E. Özkal 3899 (AEF)! Konaklı, Altes uçucu yağ tesisleri, K.H.C. Başer (ESSE 9832)! Termessos, 18.vii.1994, K.H.C. Başer (ESSE 11043)! Çiğlik kö., 19.vii.1994, G. Tümen (ESSE 10974)! Alanya, İncekum, 10.viii.1995, G. Tümen (ESSE 11942)! Konaklı, bahçe içi, 20.viii.1994, K.H.C. Başer (ESSE 11858)! Akseki çevresinden, 7.vii.1995, G. Tümen (ESSE 11467)! Bademağacı, vii.1999, S. Oflaz (ESSE 13049)! Alanya, Alantur, 25.ii.1966, A. ve T. Baytop, N. Tanker, E. Sezik (ISTE 8555)! Akseki, 18.vii.1967, H. Küçük (ISTE 12007a)! Akseki, Sadıklar kö., 13.vii.1974, A. Alpaslan (ISTE 30764)! Alanya-Manavgat, Taşağıl ilerisi, Alarahan kalesi, 100 m, G. Çakırer, A. Öztekin (ISTE 49104)! Alanya, 30.vi.1994, D. Kadıoğlu (ISTE 66290)! **Isparta:** Sütçüler, Kesme, N37°28' E31°16', 11.viii.2001, N. Sadıkoğlu (ISTE 81645)! **C4 Antalya:** Alanya-Gazipaşa, Gazipaşa'ya 12 km kala, 5.vi.1972, G. Sezik, E. Sezik 13486 (AEF)! Alanya, Kargı çayı ile Kozlu dere arasında,

1000 m, 28.viii.1947, P.H. Davis 14247 (ANK)! Alanya, Alanya kalesi içinden, 250 m, 12.v.1971, Huber-Morath 53 (ANK)! Alanya Kalesi, 5.v.1989, G. Korucu (AEF)!, (ESSE 9313)! Anamur-Alanya'ya 16 km kala, yol kenarı, 21.v.1985, K.H.C. Başer (ESSE 7320)! Alanya, Altes, 18.ix.1994, K.H.C. Başer (ESSE 11036)! Gazipaşa-Alanya, 8 km, 30 m, 18.vii.1995, K.H.C. Başer 1178, H. Duman, A. Altıntaş (ESSE 11643)! Alanya, 25.vi.1994, T. Baytop (ESSE 10802)! Alanya, 7.viii.2000 (ESSE 13292)! Anamur Gazipaşa yolu, 52. km, 9.viii.1965, N. ve M. Tanker, E. Sezik (ISTE 8284)! Alanya, Emirgan civarı, yol kenarları, 21.viii.1965, E. Sezik, M. Tanker (ISTE 8317)! Demirtaş-Bıçkıcı, Delice deresi yakını, 27.v.1966, A. ve T. Baytop, B. Çubukçu (ISTE 9714)! Alanya Kalesi, 26.v.1966, A. ve T. Baytop, B. Çubukçu (ISTE 9669)! Anamur-Gazipaşa, 29.v.1966, M. Tanker (ISTE 10269)! Alanya-Gündoğmuş, Güzelbağ, 750 m, 5.viii.1980, E. Tuzlacı, B. Çubukçu, A. Meriçli (ISTE 45672)! Alanya-Gazipaşa, Alanya'dan 32 km, 20 m, deniz kıyısındaki yamaçlar, 6.viii.1980, E. Tuzlacı, A. Meriçli (ISTE 45691)! Alanya, Konaklı kö., viii.1991, K.H.C. Başer (ISTE 63632, ESSE 9605, GAZI)! Alanya Y., 2.v.1994, D. Kadioğlu (ISTE 68334)! Alanya, Alarahan, 23.vi.1978, (EGE 19297)! **Karaman:** Mut-Ermenek yolu, Kayaönü Köyü çevresi, 900 m, 24.vii.1981, M. Koyuncu 4548, F. İzgü (AEF 12270)! Ermenek, Kayalık kurak yamaçlar, 1250 m, 16.vi.1979, M. Vural 1697 (ANK)! Ermenek, Söğütlü mevkii, ca., 1000 m, 9.viii.1998, (EGE 19649)! Ermenek, ca., 1000 m, 9.viii.1998, (EGE 19650, EGE 19651)! Ermenek, Meydankeberi çeşmesi, 23.vi.2001, N. Tabanca 29, S. Çelik (ESSE 14037)! **Mersin:** Mut, Adras Dağı, 1500 m, 20.vii.1977, M. Vural 1978 (GAZI, ADA 410)! Gülnar çevresi, bahçeler, 900 m, 27.x.1981, M. Koyuncu 4678, O. Soner (AEF)! Gülnar-Aydıncık, 400-600 m, 24.vi.1987, M. Koyuncu 8200 (AEF 14747)! Anamur, Yoğundular Mevkii, ca. 30 m, 30.vii.1979, *P. brutia* altı, F. İlisulu 6731 (AEF)! Anamur, Koncağa kö., 1500-1600 m, 25.viii.1994, U. Temel (MARE 4564)! Anamur-Bozyazı'ya giderken, yol kenarı, 30.v.1994, G. Tümen (ESSE 10659)! Gülnar çevresi, 7.vii.1995, G. Tümen (ESSE 11468)! Gülnar, Büyükkeçeli kö., 10.v.1995, G. Tümen (ESSE 11367)! Anamur, iii.1995, K.H.C. Başer (ESSE 11736)! Soğucak, vii.1998, E. Şanlı (ESSE 13071)! Anamur, Çamalağı Y., Devrent mevkii, 1600 m, 15.vii.2000, G. Tümen (ESSE 13326)! Gülnar-Aydıncık, Gülnar'a 10 km, 900 m, 15.vi.1981, E. Tuzlacı (ISTE 46501)! Mut-Silifke, Göksu nehri vadisi, sert kireçtaşı kayalıklar, vi.1994, A.J. Byfield 1186 (ISTE 67441)! Anamur, Olucak (Ermenek-Anamur), 1400 m, 18.viii.1949, P.H. Davis 16333A (ANK)! Anamur, *Pinus brutia-Quercus* ormanı, 900 m, 18.ix.1949, P.H. Davis 16341 (ANK)! Silifke'nin güneyi, Kalker kayalıklarda, 1970, Quézel et all. 45 (ANK)! Anamur, 1500 m, 18.viii.1949, (EGE 27361)! **C5 Mersin:** Lamas vadisi, *Arbutus andrachne* makisi, T. Uslu 1488 (ANK)! Anamur, Kaş Y., vii.1991, G. Tümen (ESSE 9563)! Gülek boğazı, Maden bölgesi civarı, dağdan, 25.vii.1994, G. Tümen (ESSE 10765)! Mersin-Kuzucubelen, Anayoldan 16 km, 510 m, 5.vi.1988, N. ve E. Özhatay (ISTE 59058)! Tarsus, Orman Araştırma Enstitüsü Müdürlüğü-kültür-30.6.2004, N. Sadıkoğlu (ISTE 81708)! Tarsus, Mezitli-Kuzucubelen-Fındıkpinarı, Kuzucubelen'den 2.5 km, 730 m, 25.vi.2004, N. ve E. Özhatay, Ş. Kültür (ISTE 82435)! Tarsus, Mezitli-Fındıkpinarı, Kuzucubelen'den 3 km, 750 m, 25.vi.2004, N. ve E. Özhatay, Ş. Kültür (ISTE 82446)! **C6 Hatay:** Samandağı-Hancağ, kurak-açık alan, 8.x.97, d.s. L. Behçet 14 (VANF)! **Osmaniye:** Odun deposu karşısı, Amanus dağları, ca. 500 m, 23.ix.1967, maki, Y. Akman (AEF)!

***Origanum onites* L.**

**A1(A) Çanakkale:** Ezine, Kemallı kö., 20.vi.2002, G. Emre (MARE 8361)! Ezine, Koçali kö., 350 m, 20.vi.2002, G. Emre (MARE 8360)! Ezine, Dalyan kö., yamaç, 50 m, 19.iv.2002, G. Emre (MARE 8339)! Ezine, Mahmudiye kö, 50 m, 18.iv.2002, G. Emre (MARE 8318)! **Balıkesir:** Marmara adası, kuzey cephe, mermer ocakları tarafı, 17. vi.1968, A. Baytop, T. Avcıgil (ISTE 13782)! **A5 Amasya:** Bozdoğan-Akdere köyleri, 30.ix.1965, (EGE 6105)! **B1 Balıkesir:** Ayvalık, Şeytan Sofrası, 100 m, 19.v.1977, İ. Akbulut (IZEF 368)! Edremit, Altınoluk, 5.vii.1965, (EGE 6368)! Kazdağ, Kapıkule'ye çıkarken, 17.vii.1991, G. Tümen (ESSE 9568)! Zeytinli, Kaz da., Mehmetalan-Sarıkız, Mehmetalandan 5 km, 570 m, 16.vii.1994, N. ve E. Özhatay, A.J. Byfield (ISTE 69992)! Çanakkale: Behramkale-Assos, 50 m, 12.vii.1997, E. Tuzlacı (MARE 5512)! Ayvacık, Behramkale kö., Kadırğa mevki, d.s., 11.vii.1983, K. Alpınar (ISTE 51660)! Kazdağı, Ayazma, 500 m, 7.viii.1996, N. ve E. Özhatay, S. Saçlı, E. Akalın (ISTE 72436)! İzmir: 6 km S Armutlu, ca. 400 m, 27.x.1992, E. Saver (IZEF 1852)! Belkahve-Bornova, 13.v.1992, E. Saver (IZEF 1694)! Çeşme yolu, 15.v.1978, İ. Akbulut (IZEF 368)! Asklepion, 17.v.1977, İ. Akbulut (IZEF 364)! Yamanlar, 150-300 m, İ. Akbulut (IZEF 343)! Çeşme, 16.vi.1976, F. Şekerci (IZEF 351)! 1-2 km N Ahmetbeyli-Gümüldür, kalkerli kayalar, 26.v.1993, E. Saver (IZEF 1125)! d. Seferhisar, Sığacık-Teos, 15.v.1993, N. ve U. Zeybek (IZEF 1243)! Gümüldür-Karacadağ, Değirmendere, ca. 100 m, 16. vi.1986, (EGE 21796)! Gümüldür-Karacadağ, kuzey yamacı, ca. 600-700 m, 10.vi.1987, (EGE 21795)! Bergama, Kozak, Nazilli-Kaplan köyü arası, 580 m, 3.vi.1987, (EGE 19682)! Seferihisar Terkos civarı, ca. 0-50 m, 16.v.1986, (EGE 21797)! Nif da., Kurudere-Ovacık köyü, 600 m, 28.vi.1973, (EGE 13778)! Hills NE of Bornova, 26.v.1969, (EGE 4400)! Dikili, Gürün-Geyikli da., 24.vi.1965, (EGE 6095!, 6096)! Dikili, Çağlayan kö., 24.vi.1965, (EGE 6085, 6096)! Kemalpaşa, Nif Da., c. 1500 m, 6.vii.1969, (EGE 7319)! Nif da., 31.v.1966, (EGE 5572)! Balçova baraj civarı, ca. 40-50 m, 27.viii.1982, (EGE 26508)! Nif dağ-Kemalpaşa, 7.vi.1966, (EGE 841)! Kemalpaşa, Nif dağı üstü, ca. 400 m, 19.vi.1975, (EGE 2928)! Kemalpaşa, Nif dağı, 8.vii.1965, (EGE 3138)! Meryemana'ya 7 km, 6.vi.1974, N. Tanker 4511 (AEF)! Gülbahçe, Pirene harabeleri, 30.5.1972, E. Sezik, G. Sezik (AEF 13477)! Bergama, Asklepion antik kalıntılar çevresi, 100 m, 4.vii.1996, E. Tuzlacı (MARE 5056)! Kemalpaşa, piknik yeri, Nif D. etekleri, 280 m, 23.vi.1990, E. Tuzlacı (MARE 2744)! Karşıyaka, Yamanlar da. yöresi, 3.vi.1995, G. Tümen (ESSE 11364)! Ödemiş, Konaklı, 10.vii.1999, S. Oflaz (ESSE 13050)! Bayındır, Ergenli kö., Ilıca yakını, 210 m, zeytinlik yamaçlar, 29.v.1980, E. Tuzlacı, T. Çelebioğlu (ISTE 44304)! **Manisa:** Akhisar, Akhisar yol değirmeni, 9.vi.1942, H. Bağda 436 (ANK)! Pınarbaşı, v.1946, A. Berk (ESSE 9505)! Sipil da., vii.1993, G. Tümen (ESSE 10150)! Kula-Kavacık kö., 17.vi.1993, G. Tümen (ESSE 10133)! Manisa da., 3.v.1961, T. Baytop (ISTE 6413)! Soma, Yağcılı kö. üstleri, Sarıkız kalesi, 25.vii.1982, G. Çakırer (ISTE 49569)! **B2 Afyon:** Afyon'dan Banaz'a 25 km kala, ca. 1250 m, 23.vi.1977, İ. Akbulut (IZEF 2180)! **Denizli:** Buldan-Türlüboğ kö., 28.vi.1995, G. Tümen (ESSE 11422)! İzmir: Kiraz, Suludere kö., tepeler, 17.v.1988, M. Çetin (ESSE 9167)! Kiraz, Emenler kö., G. Tümen (ESSE 10586)! **Manisa:** Kula'nın 11 km kuzeybatısı, c.100-300 m, 7.vi.1974, (EGE 12768)! **B3 Eskişehir:** Eskişehir-Kütahya 10 km, Porsuk nehrinin kenarı, 4.



viii.1985, H. Malyer (ESSE 7211)! Aktaş-Sivrihisar -kültür- 28.vi.2001, E. Çubuk, S. Urfalı (ESSE 13856)! **C1 Aydın:** Dilek Yarımadası, Samsun Dağı, Y. Akman 7640 (ANK)! Piriye Harabeleri, 30.v.1972, N. Tanker 3583 (AEF)! Kuşadası-Efes yolu, Bergama, 30.v.1972, N. Tanker 3608 (AEF)! Kuşadası-Davutlar, Güzelçamlı k, Küçük Kalamaki koyu, c. 10 m, 24.v.1972, (EGE 10147)! Kuşadası-Kalamaki, 12.v.1968, (EGE 3330)! Koçarlı, Evsekler kö., 20.vi.2002, E. Sadıkoğlu (MARE 8477)! Koçarlı, Çulhalar kö., 500 m, 7.vii.2001, E. Sadıkoğlu (MARE 7195, 7203)! Koçarlı, Çeşmeköy, 4. iv.2002, E. Sadıkoğlu (MARE 8436)! Koçarlı, Taşköy, 22.vi.2002, E. Sadıkoğlu (MARE 8495)! Koçarlı, Esentepe kö., köy yamaçları, 19.vi.2002, E. Sadıkoğlu (MARE 8462)! Koçarlı, Yağcıdere kö., 16.v.2002, E. Sadıkoğlu (MARE 8437)! Koçarlı, Şahinciler kö., 14. iv.2002, E. Sadıkoğlu (MARE 8407)! Koçarlı, Halilibeyli kö., 1.iv.2002, E. Sadıkoğlu (MARE 8431, 8434)! Koçarlı, Dedeköy, 5. iv.2002, E. Sadıkoğlu (MARE 8400)! Koçarlı, Kuşlar beleni kö., 22.vi.2002, E. Sadıkoğlu (MARE 8493)! Koçarlı, Tığlılar kö., 20. vi.2002, E. Sadıkoğlu (MARE 8473)! Kuşadası, Kale çevresi, 10 m, 1.vii.1996, E. Tuzlacı (MARE 5035)! Samsun da., Güzelçamlı üstleri, 340 m, 5.vii.1989, E. Tuzlacı (MARE 1936)! Koçarlı üretme çiftliği -kültür- 25.iv.1992, M. Polat (ESSE 9596)! Yenipazar, zeytinlik kenarı, 25.v.1992, S. Aydın (ESSE 9582)! 6.vi.1993, G. Tümen (ESSE 10116)! Priene antik eserlerin bulunduğu yer, 15.iv.1995, G. Tümen (ESSE 11221)! Priene-Güllebahçe, 4.vi.1995, G. Tümen (ESSE 11365)! Priene harabeleri, Mykali yöresi, antik tiyatroların içi, 15.iv.1995, G. Tümen (ESSE 11808)! *ibid.*, 8.v.1995, G. Tümen (ESSE 12303)! Priene, 20.v.1995, G. Tümen (ESSE 11363)! Söke, Priene harabeleri, 5.vi.1995, G. Tümen (ESSE 13024)! Paşa Y. Yolu, 20.vii.1949, T. Baytop (ISTE 2416)! Priene, sırtlarda, 30.v.1972, A. ve T. Baytop (ISTE 22061)! Söke çıkışı, Sazlıköy Sugözü mevkii, 50 m, 13.v.1983, K. Alpınar (ISTE 50355)! İzmir: Meryemana, Efes, 18.vi.1963, (EGE 842)! Meryemana-İzmir, 9.vi.1964, (EGE 843)! Efes harabeleri, 28.vi.1992, Z. Erdemgil (ESSE 9580)! **Muğla:** Milas-Ören 13 km, ca. 100 m, 24.vii.1980, (EGE 32347)! Bodrum, kasabanın yukarısındaki antik tiyatronun doğusu, 100 m, 37°8'N 27°26'E, açık arazi, meşe ve zeytinlik, kireçli kayalık, sık, 15.iv.1989, R.M. Nessitt ve D. Samuel 2198 (GAZI)! Datça, Sarılıman çevresi, ca. 10 m, 23.iv.1987, makilik, N. Tanker, M. Koyuncu 8123 (AEF 14402)! Bodrum, Dağbelen kö. Kuzeyi, 270 m, 9.iv.2001, E. Tuzlacı (MARE 6629)! Bodrum, Adaboğazi, deniz kenarı, d.s. 21.viii.1989, E. Tuzlacı (MARE 2212)! Bodrum, Ortakent-Yalıkavak, 5.v.1992, E. Tuzlacı (MARE 3603)! Bodrum, Turgutreis, Kadıkalesi doğusundaki dağ tepesi, 28.viii.2002, E. Tuzlacı (MARE 8169)! Bodrum, Dereköy, Kavak deresi çevresi, 40 m, 12.v.2002, E. Tuzlacı (MARE 7888)! Bodrum, Tepecik kö. çevresi, 10.v.2002, E. Tuzlacı (MARE 7775)! Bodrum, Dağbelen kö. yakını, 240 m, 2.vi.2002, E. Tuzlacı (MARE 7403)! Bodrum, İçmeler-Bodrum, 20 m, 3.v.2002, E. Tuzlacı (MARE 7483)! Bodrum, Yalıkavak, Küdür yarımadası, 12.iv.2001, E. Tuzlacı (MARE 6735)! Bodrum, Ortakent, Yalıkavak yolu, 100 m, 25.iii.2000, E. Tuzlacı (MARE 6212)! Bodrum, Yaka kö. yakını, 70 m, 18.vi.2001, E. Tuzlacı (MARE 6938)! Bodrum, Karabağ kö. çevresi, 120 m, 16.vi.2001, E. Tuzlacı (MARE 6855)! Bodrum, Karaincir üstündeki dağ, doruk çevresi, 200 m, 11.iv.2001, E. Tuzlacı (MARE 6760)! Bodrum, Bürece-İslamhane, 50 m, 19.vi.2001, E. Tuzlacı (MARE 7003)! Bodrum, Gündoğan-Gölköy, Gündoğan yakını, 100 m, 17.vi.2001, E. Tuzlacı (MARE 6882)! Bodrum, Geriş köyünün batısındaki yamaçlar, 50 m, 14.vi.2001, E. Tuzlacı (MARE 6804)! Bodrum,

Gümüşlük kö. çevresi, dere kenarındaki kayalık yamaçlar, 30.x.1979, E. Tuzlacı (ISTE 43844)! Datça, Bozdağ (Kocadağ), Mesudiye kö. üstleri, 500 m, 3.vii.1983, E. Tuzlacı (ISTE 51485)! Mesudiye, batı yamaçları, kayalık yerler, 900 m, 3.vii.1983, E. Tuzlacı (ISTE 51539)! Datça, Knidos harabeleri, 10 m, 4.vii.1983, E. Tuzlacı (ISTE 51559, ISTE 51561)! Datça, deniz kıyısındaki yamaçlar, 5 m, 4.vii.1983, E. Tuzlacı (ISTE 51567)! Bodrum, Bitez kö. çevresi, 30 m, 7.vii.1983, E. Tuzlacı (ISTE 51608)! Bodrum, Turgut Reis güneyi, Doru da. güney yamaçları, 230 m, 16.v.1984, E. Tuzlacı (ISTE 53839)! Bodrum, Paşa tarlası mevkiinden satın alındı, 25.viii.1995, F. Günergün (ISTE 68376)! Bodrum, Konacık-Bitez, Çökertme Gazetesi önü, 10.vi.2003, N. Sadıkoğlu (ISTE 81670)! Gök köy, Eski Gök köy Lisesi sırtları, 11.vi.2003, N. Sadıkoğlu (ISTE 81673)! **C2 Antalya:** Avlan gölü kıyıları, 28.vi.1979, (EGE 16971)! Elmalı-Finike yolu, Elmalı'dan 18 km, eski Avlan Gölü çevresi, taşlık, kayalık yamaçlar, 1040 m, 23.vii.1985, E. Tuzlacı (MARE 102)! Elmalı'nın kuzeybatısındaki sırtlar, 1100 m, ağaçlandırma sahası, 24.vi.1980, N. ve E. Özhatay, E. Tuzlacı (ISTE 45014)! Korkuteli Fethiye yolu, Söğüt'ten 4 km, 1400 m, N. Özhatay, E. Tuzlacı, B. Çubukçu, A. Meriçli (ISTE 45626)! Fethiye, Manastır koyu üstleri, 10.viii.1981, M. Saraçoğlu, A. Meriçli, N. Sütlüpinar (ISTE 47524)! **Aydın:** Sultanhisar, 1987, 01.i.1950, M. Polat (IZEF 1752)! *ibid.*, 01.i.1950, M. Polat (IZEF 1775)! **Denizli:** Çardak, Maymun Dağı, Devrent mevki, 950 m, 27.vii.1984, kayalıklar, Z. Aytaç 1614 (GAZI)! Denizli-Cankurtaran yolu, Cankurtaran yakını, yol kenarı, 3.vi.1978, kayalık yamaçlar, F. İlisulu (AEF 13920)! Pamukkale, 5.vi.1941, H. Bağda s.n. (ANK)! Çamlık, taş ocağı, 550 m, 9.vii.1962, K. Karamanoğlu 842 (ANK)! Honaz, Başalan mevki, yolun sağındaki yamaç, 23.vii.1992, F. ve A.H. Meriçli (MARE 3793)! Sarayköy, Tekke kö., S. Akşit (MARE 6106)! Acıpayam, Olukbaşı-Bozdağ, 1100 m, 13.vii.1992, A. Kaya (ESSE 10581)! Nikfer kasabası, Burunucu da., 19.vi.1996, G. Tümen (ESSE 12255)! Denizli-Aydın, Manastır, 7.vii.1905, St-Lager (ISTE 1273)! Çukur kö.-Denizli, dağ yamacı, 700 m, 28.vi.1972, E. Tuzlacı (ISTE 22709)! Honaz da., Çatal Y. altı, Karateke kö. üstü, *Quercus* alanı, 890 m, 1.vii.1972, E. Tuzlacı (ISTE 22897)! Honaz da., orman yolu, 700 m, 10.vi.1973, A. Baytop, E. Tuzlacı (ISTE 25743)! Honaz da., Çukurköy-Denizli, Karatepe ağaçlandırma sahası, 750 m, 24.vii.1973, E. Tuzlacı (ISTE 26572)! Pamukkale eteği, 1000 m, 25.ix.1979, A. Baytop, M. Saraçoğlu (ISTE 43787)! Pamukkale, harabelerin üstündeki kıraç yamaçlar, 550 m, 1.vi.1980, E. Tuzlacı, T. Çelebioğlu (ISTE 44409)! Eksere-Kale, Eskere'den 15 km, 1040 m, kayalık yerler, 20.vi.1980, N. ve E. Özhatay, E. Tuzlacı (ISTE 44842)! **Muğla:** Marmaris-Datça, 200 m, 5.vi.1962, (EGE 27255)! Fethiye-Kemer taşocağı, 10.vii.1966, (EGE 5013)! Yatağan-Milas, orman içi, 21.v.1970, N. Tanker, E. Sayrön, E. Demir, T. Avengil 3041 (GAZI)! Dağyan-İztuzu, Sülüngür Gölü kıyısı, 20 m, 18.v.1991, makilik, kalkerli kayalık, A. Güner 9031, M. Vural, H. Şağban (GAZI)! Köyceğiz, Yangı Köyü, Yangı Deresi, 60-80 m, 25.v.1991, sarp ve derin vadi, kalkerli kayalık yamaçlar, kazmofit, A. Güner 9327, M. Vural, H. Şağban (GAZI)! Yatağan-Milas arası, 21.v.1970, orman içi, N. Tanker, E. Sayran, E. Deniz, T. Avcıgil 3041 (AEF)! Fethiye, Termessus, P.H. Davis 13705 (ANK)! Marmaris, 12.vii.1960, Khan et all. 20 (ANK)! Marmaris, Kumlubel Üniv. Kampı civarı, 16.v.1987, K.H.C. Başer (ESSE 8174)! Köyceğiz, radar arkası, tepeler, 29.v.1988, K.H.C. Başer (ESSE 8356)! Marmaris-Kumlubük, 16.v.1993, H. Malyer (ESSE 10069)! Gökova-Akkaya kö., 5.vi.1993, S. Erken (ESSE 10317)! Köyceğiz, Sandras da., 470 m, kaynak su

kenarı, 19.vi.1995, K.H.C. Başer 1028, H. Duman, A. Altıntaş (ESSE 11340)! Fethiye, Kızılbel kö., 20.viii.1995, G. Tümen (ESSE 12035, 12032)! Kıran kö., Madanyeri mevkii, 15.vii.1995, G. Tümen (ESSE 12299)! Fethiye, Babadağı, 1500 m, 8.ix.1999, G. Tümen (ESSE 13028)! Fethiye, Eşen yakını, Pınara harabeleri, 350 m, 1.vii.1983, E. Tuzlacı (ISTE 51468)! Muğla, 22.vii.1949, T. Baytop (ISTE 2431)! Ula Köyceğiz yolu, sırtlarda, 8.vi.1973, A. Baytop, E. Tuzlacı (ISTE 25628)! Sandras da., Panguduz, Karadoruğun güneybatı yamaçları, 1400 m, 13.vii.1978, N. ve E. Özhatay (ISTE 40603)! Kale-Muğla, Muğla'ya 5 km, 920 m, taşlık yamaçlar, 20.vi.1980, N. ve E. Özhatay, E. Tuzlacı (ISTE 44874)! Köyceğiz, Sandras da., Ağla üstleri, 900 m, 21.vi.1980, N. ve E. Özhatay, E. Tuzlacı (ISTE 44883)! Köyceğiz, Sandras da., Serçegediği çiçeklibaba tepesinin kuzeybatı yamaçları, Ağla atları, 100 m, 22.vi.1980, N. ve E. Özhatay (MUFÉ 742)! Köyceğiz-Dalyan, Kaunos harabeleri, 6.viii.1981, M. Saraçoğlu, A. Meriçli, N. Sütlüpınar (ISTE 47517)! Fethiye Baba da. yolu, Ovacık ilerisi, 650 m, 31.x.1981, A. ve T. Baytop (ISTE 47695)! Fethiye, Kemer, Armutağacı kö. yakını, Akdağ batı etekleri, 1.vii.1983, E. Tuzlacı (ISTE 51440)! Fethiye, Baba da., kuzey etekleri, 600 m, 30.vi.1983, E. Tuzlacı (ISTE 51422)! Muğla, Taşlıca civarı, 300 m, 9.xi.1984, T. Baytop (ISTE 55087)! Bozukkale, 22.vi.1993, N. Sütlüpınar (ISTE 67671)! **C3 Antalya:** Kemer, Beycik Köyü üstü, 800-1900 m, 19.vii.1978, kalkerli kayalık arası, *Pinus brutia-Cedrus libani* ormanı ve alpinik step, H. Peşmen 3877, A. Güner (GAZI)! Manavgat, Homa kö., 100 m, 28.v.1973, E. Özkal 3900 (AEF 18149)! Antalya-Side harabeleri, 21.v.1969, K. Karamanoğlu, M. Koyuncu 1749 (AEF)! *ibid.*, 20.5.1972, K. Karamanoğlu, M. Koyuncu, K. Baykal, G. Sezik 1908 (AEF)! Gazipaşa'dan 30 km sonra kaya üzerinde bozuk çam ormanı, meşe, keçiboynuzu, 16.v.1956, H. Birand 30 (AEF)! Konyaaltı, belediye obaları arkası, 5.vi.1981, kayalıklar, F. İlisulu (AEF 13911)! Konyaaltı plajı karşısındaki Ökalyptus ormanı, dipteki kayalıklar, 9.vi.1992, A. ve U. Güvenç (AEF 16669)! Perge harabeleri, 13.viii.1979, F. İlisulu 6652 (AEF)! Turunç-Marmaris, 2.v.1975, *s.n.* (AEF)! Antalya-Akseki yol ayrımı, Akseki'ye 5 km, yol kenarları, 6.vi.1981, M. ve N. Tanker, E. Şarer, F. İlisulu (AEF 10833)! Elmalı-Finike, 780 m, 24.vi.1982, E. Şarer, M. Yaman, M. Coşkun 650 (AEF 10376)! Antalya-Perge harabeleri, 20.v.1971, K. Karamanoğlu, M. Koyuncu, K. Baykal, G. Sezik 3702 (AEF)! Burdur'dan Antalya'ya giderken 40 pınar, Antalya'ya 30 km, 20.v.1969, K. Karamanoğlu, M. Koyuncu 1755 (AEF)! Kemer, Kızdere köyü, Kesme boğaz- Sumak seheri arası, 400-500 m, 4.vii.1981, S. Kurucu (AEF 9559)!, Kırkgöz'ün batısındaki kepirler, 21.ix.1976, R. Çetik *s.n.* (ANK)! Antalya'ya 10 km kala, maki, 500 m, 13.v.1956, Huber-Morath 15 (ANK)! Bozburun Dağ, 1900 m, 24.vii.1949, P.H. Davis 15522 (ANK)! Kemer'e 10 km kala, maki zonu, Y.Akman 13633 (ANK)! Göynük, 50 m, 5.vii.1949, P.H. Davis 15012 (ANK)! Deniz kıyısındaki dik kayalıklarda, 1970, Quézel et all. 03 (ANK)! Antalya yöresindeki kayalıklarda, 1968, P.Quézel et all. 23 (ANK)! Burdur-Kırkgöz bataklığının biraz ilerisi, Karakol karşısı, kalker, çok iyi maki, 290 m, Huber-Morath 34 (ANK)! Isparta- Antalya, Bucak'a 15 km kala, 900 m, 24.vi.1982, kayalarda, M. Coşkun 637, E. Şarer, M. Yaman (AEF 10383)! Mavikent, Kumluca, Yenice kö., 8.iv.1998, B. Sadak (MARE 5814)! Beycik kö., Hazma Cesur'un bahçesinden, 31.v.1990, K.H.C. Başer, N. Kurtar (ESSE 8781)! Termesos (Güllük dağı), 1.vi.1989, K.H.C. Başer, N. Kurtar (ESSE 8568)! Beycik, 2.vi.1989, K.H.C. Başer (ESSE 8991)! Antalya-Konaklı kö., 1991, K.H.C. Başer (ESSE 9695)!

Antalya-Isparta yolu üzerindeki dağlar, vii.1993, G. Tümen (ESSE 10200)! Manavgat, Yukarıışıklar kö., Karıştan M. yaylaları, 15.vii.1993, G. Tümen (ESSE 10134)! Koyunlar kö., G. Tümen (ESSE 10972)! Bademağacı mevkii, 25.v.1999, S. Oflaz (ESSE 12227)! Kemer, Kaya kö., Kınalı mevkii, 26.v.1998, G. Tümen (ESSE 13022)! Lara yolu üzeri, 4.viii.1965, N. ve M. Tanker (ISTE 8237)! Antalya-Burdur, 50. km, Çubuk boğazı, 4. viii.1965, N. ve M. Tanker (ISTE 8251)! Konyaaltı, 12 Eylül ormanı, 20 m, 15.vi.1983, H. ve G. Çakırer (ISTE 50908)! Tahtalı da., Kemer-Ovacık, Ovacık'a 22 km, 600 m, 3.vi.1988, N. ve E. Özhatay (ISTE 59005)! Beycik, 2.vi.1989, K.H.C. Başer 8991 (ISTE 66354)! Kumluca üstü, 12.v.1995, O. Peker (ISTE 67728)! **Burdur:** Dağ, 900 m, 12. vi.1983, A. Koçak, 4315 (GAZI)! Tefenni, Karanlıkdere çevresi, 14.vii.1992, G. Tümen (ESSE 9824)! Bucak-İncirhanı mevkii -kültür- 22.ix.1999, S. Oflaz (ESSE 13055)! **Isparta:** Eğirdir, Atabey girişi, 1400 m, 10.vi.1983, (EGE 37270)! Eğirdir-Tepeliköy, vii.1993, G. Tümen (ESSE 10443)! Sütçüler, Çandır, 1500 m, 13.ix.1999, S. Oflaz (ESSE 13057)! Sütçüler, Kesme, N37°28' E31°16', 11.viii.2001, N. Sadıkoğlu (ISTE 81646)! Eğirdir, Akbelenli kö., Cırbeyil mevkii, yol kenarlarındaki yükseltiler, 860 m, 16.vi.1994, M.K. Erol (MARE 4272)! **Konya:** Konya-Beyşehir, Kurucuova, Kırsekil tepe, Mahmure kuyusu mevkii, 1350 m, 16.vi.1981, M. Serin (MUFE 407)! **C4 Antalya:** Gazipaşa, Çobanlar köyü çevresi, 100 m, 25.vi.1987, M. Koyuncu 8214 (AEF 14445)! Gazipaşa'dan 30 km sonra, kaya üzerinde bozuk çam ormanı, meşe ve keçiboynuzu 16.v.1956, Huber-Morath 30 (ANK)! Gazipaşa-Anamur, 24. km, 420 m, kayalıklar ve çevresi, 18.vii.1995, K.H.C. Başer 1182, H. Duman, A. Altıntaş (ESSE 11638)! **C5 Adana:** Karsantı, Pos Ormanları, Sarı çiçek civarı, *Abies cilicica* topluluğu, Anakaya Kalker, 1300 m, 12. vii.1974, E. Yurdakulol 1506 (ANK)! vi.1989, M. Özgüven (ESSE 8972)! Çukurova Üniv. Ziraat Fak. -kültür- 12.vi.1989, M. Özgüven (ESSE 8743)! **C6 Hatay:** Yayladağ, Sebenoba kö., tarla içi-kültür-29.vi.2004, N. Sadıkoğlu (ISTE 81699)! *ibid.*, başka bir tarla-kültür-29.vi.2004, N. Sadıkoğlu (ISTE 81702)!

### ***Origanum syriacum* L. subsp. *bevanii* (Holmes) Greuter & Burdet**

**C5 Adana:** Karsantı, Akören, Değirmencik mevkii, *Laurus* makisi, anakaya kalker, 930 m, 3.vii.1973, E. Yurdakulol 1507 (ANK)! Bahçe (Amanos) Dildil Dağı, 27.viii.1949, P.H. Davis 16415 (ANK)! Ç.Ü. Ziraat Fakültesi Tarla Bitkileri Bölümü bahçesi -kültür- 12.i.1990, M. Özgüven (ISTE 63781, 63782)! *ibid.*, 12.vi.1989 (ESSE 8746)! Ç.Ü. Kampüs içi, Mühendislik Fakültesi arka kıyısı, göl kenarı, su üst sınırı, 18.viii.1989, H. Çakan 006 (ADA 2303)! Kozan, Horzum Y., 26.ix.1992, V. Zaimoğlu (ESSE 10578)! Düldül Da., Haruniye'nin bir köyü, G. Tümen (ESSE 10397)! **Hatay:** Samandağ-Çevlik, kayalıklarda, 6.viii.1986, M. Topaloğlu (ISTE 57167)! Tekepınar ilerisi, Musa dağı, maki arası, 450 m, 31.vi.1979, E. Tuzlacı, M. Saraçoğlu (ISTE 42300)! **Mersin:** Mersin Gözne yolu, Dalakdere kö., kayalık yamaçlar, 5.vi.1981, E. Tuzlacı (ISTE 46373)! Tarsus, Orman Araştırma Enstitüsü Müdürlüğü-kültür-30.vi.2004, N. Sadıkoğlu (ISTE 81706)! *ibid.*, 30.vi.2004, N. Sadıkoğlu (ISTE 81707)! **C6 Hatay:** Erzin, Başlamış köyü üstü maki, 400 m, 31.viii.1990, Türkmen 497 (ADA 3156)! Çobandere Verici İstasyonu, Apışkaya Y. çeşmesi çevresi, 8.viii.1994, G. Tümen (GAZI)! Ziyaret Dağı, vericiden aşağıya inerken yol kenarı, 1160 m, 13.viii.1999, Z. Aytaç 20843 (AEF)! İskenderun, Soğukoluk-Karlıtepe, Soğukoluk'a yakın, 18.vii.1971, E. ve G. Sezik (AEF 18150)!

Soğukoluk, Karlık te., 1150 m, 17.vii.1996, E. Düzenli, Türüntüç (ADA 4046)! Dörtüol, Amanos Dağ, Cıvık mevkii, 1150 m, 20.ix.1967, Y. Akman 7662 (ANK)! Antakya, St. Pierre Kilisesi, 150 m, Mgf. 1457 (ANK)! Altınözü, Kuseyr da., 24.vi.1978, A. Meriçli (ISTE 40190)! Antakya, Kuseyr da, 19.vi.1976 (ISTE 35150)! Yayladağ-Bezge, Keldağ, Bezge sırtları, 6.vii.1975, M. Miski (ISTE 32988)! Arsuz-Ayma, Seki kö, ca. 500-600 m, 6.vii.1998, (EGE 19657)! Güzelyayla, Belen, ca. 900 m, 29.vi.1998, (EGE 19656)! Dörtüol, 5.xi. 1991, K. Mazlum (ESSE 10485)! Hatay-Amanoslar, vii.2000, S. Oflaz (ESSE 13356)! Habibneccar da., 27.viii.1998, G. Tümen (ESSE 13199)! Antakya, St. Pierre kilisesi-Haron heykeli, 200 m, 16.ix.2003, N. Sadıkoğlu (ISTE 81675)! *ibid.*, 25.vi.2004, N. Sadıkoğlu (ISTE 81693)! Yayladağ, Sebenoba kö., 17.ix.2003, N. Sadıkoğlu (ISTE 81676, 81677, 81701)! Yayladağ-Şenköy, yol kenarındaki *Quercus* lu sırtlar, 17.ix.2003, N. Sadıkoğlu (ISTE 81678, 81679, 81680)! Dörtüol, Bülke, 700 m, 18.ix.2003, N. Sadıkoğlu (ISTE 81681, 81682, 81683, 81684)! Dörtüol, Mantos, 800 m, 18.ix.2003, N. Sadıkoğlu (ISTE 81687, 81688, 81689)! Habibneccar da., 28.vi.2004, N. Sadıkoğlu (ISTE 81698)! Yayladağ, Gözlüce kö., Keldağ eteklerinde, 29.vi.2004, N. Sadıkoğlu (ISTE 81703)! Yayladağ, Yayıkdamlar kö., Keldağ etekleri-kültür-29.vi.2004, N. Sadıkoğlu (ISTE 81704)! **Kahramanmaraş:** Büyüksır kö., 20.vii.1991, G. Tümen (ESSE 9212, 10583)! **Osmaniye:** Osmaniye-Hüseyinoluk Y., 20 km, 12.viii.1994, G. Tümen (GAZI)!

***Origanum vulgare* L. subsp. *hirtum* (Link) Ietsw.**

**A1(A) Balıkesir:** Gönen, Geyikli'den Armutlu'ya doğru solda, Alabalık çiftliği önü, 210 m, 28.vi.1996, P. Eryaşar (MARE 5118)! Gönen, Ömerler kö., 310 m, 27.vi.1996, P. Eryaşar (MARE 5098)! Gönen, Taşocağı sırtları, 40 m, 30.vi.1996, P. Eryaşar (MARE 5111)! Gönen, Çallı kö., 100 m, 24.vii.1996, P. Eryaşar (MARE 5237)! Gönen, Gaygular kö., 220 m, 21.vii.1996, P. Eryaşar (MARE 5215)! Gönen, Armutlu kö., 28.vi.1996, P. Eryaşar (MARE 5127)! Gönen, Kumköy, 126 m, 29.vii.1996, P. Eryaşar (MARE 5133)! Gönen, Ömerler kö., köyden tarlalara doğru inerken, 310 m, 27.vi.1996, P. Eryaşar (MARE 5100)! Gönen, Beyoluk kö., 28.vii.1996, P. Eryaşar (MARE 5180)! Gönen, Turplu kö., 200 m, 26.vii.1996, P. Eryaşar (MARE 5160)! Erdek, Ocaklar kö., taş ocaklarının altı, 50 m, vi.1973, K.H.C. Başer (ESSE 160)! *ibid.*, vi.1973, K.H.C. Başer (ESSE 117)! Gönen yamaçlarından, 22.vi.1992, N. Ermin (ESSE 9972)! Erdek-Ocaklar kö., 8.vii.1992, K.H.C. Başer (ESSE 9966)! *ibid.*, vi.1989, K.H.C. Başer (ESSE 5055)! *ibid.*, 17.vii.1986, K.H.C. Başer (ESSE 8992)! Balıkesir, 1992, G. Tümen (ESSE 9674)! Marmara adası, güney cephe, dere yatağı, 15.vi.1968, A. Baytop (ISTE 13648)! Marmara adası, Marmara nahiyesinin üstleri, taşlık, kayalık yerler, 200 m, 27.x.1977, E. Tuzlacı (ISTE 38774)! **Bursa:** Gemlik, Küçükumla pazarı, ix.1992, Z. Topraklı (ESSE 9965)! Çanakkale: Biga, 15.vi.1993, G. Tümen (ESSE 10076)! Çanakkale, S. Oflaz (ESSE 13056)! Çan, 10.ix.2000, S. Oflaz (ESSE 13360)! **A1(E)** Çanakkale: Gelibolu, Burhanlı köyünden sonra sahilde, 13.viii.1962, K. Karamanoğlu 18151 (AEF)! Eceabat-Abide yolu, 17.vi.1986, N. Zeybek (IZEF 2288)! Gökçeada, Dereköy-Merkez, s.l. 29.vii.1975, (EGE 15836)! Gökçeada, Dereköy civarı, ca. 250 m, 1.vii.1975, (EGE 15835)! Gökçeada, Vuno tepesi doğusu, ca. 150 m, 9.viii.1976, (EGE 15930)! Gökçeada, Kömürburnu-Taşlıca tepesi, ca. 70 m, 17.vi.1976, (EGE 15931)! Gökçeada, Dereköy-Marmaris burnu,

ca. 190 m, 17.vi.1976, (EGE 15932)! Alçıtepe-Kabatepe, Kabatepe'ye 10 km kala, 1. viii.1986, A. Çırpıcı, H. Malyer (ESSE 7924)! Gelibolu, Burhanlı kö., Cennet koyuna 3 km, 29.viii.1992, M. Kürkçüoğlu (ESSE 9703)! Gelibolu, Pazarlıova, Cennet koyu, Gelibolu'na 22 km kala, 30.viii.1992, M. Kürkçüoğlu (ESSE 9702)! Gelibolu-Lapseki çevresi, 6.vii.1993, G. Tümen (ESSE 10568)! Gökçeada, 24.viii.1994, G. Tümen (ESSE 11936)! Gelibolu, Güneyli kö., denize bakan yamaçlar, 20.vii.1996, G. Tümen (ESSE 12283)! Gelibolu-Eceabat, Eceabat'a 10 km, 9.xi.1968, A. Baytop, B. Çubukçu (ISTE 14716)! İmroz adası, Şahinkaya M. karşısındaki çamlıkta, 10.x.1973, Y. Saviç (ISTE 26760)! İmroz adası, Dereköy, 18.vii.1974, Y. Saviç (ISTE 30513)! **Edirne:** Enez, Yeniceköy, 24.vii.1988, T. Baytop (ISTE 59323a)! Edirne, Kavak ormanı altı, 16.vii.1969, A. Baytop (ISTE 15663)! Keşan-Gelibolu, Koru da., Kısıkkaya mevkii, 320 m, 24. vii.1981, E. Tuzlacı (ISTE 47458)! Edirne Bosnaköy yolu, orman altı, 23.vii.1968, A. Baytop (ISTE 14493)! **Kırklareli:** Pınarhisar, G. Tümen (ESSE 12248)! **Tekirdağ:** Sulak yerler, H. Bağda (ANK)! Kumbağ sahil yolu, ca. 50 m, 13.viii.1983, N. Zeybek (IZEF 2974)! Tekirdağ-Mürefte, 300 m, 7.vii.1999, E. Tuzlacı, E. Gürkan, M. Atay (MARE 6081)! *ibid.*, 100 m, 7.vii.1999, E. Tuzlacı, E. Gürkan, M. Atay (MARE 6064)! Ganos da., 500 m, 14.vii.1968, A. Baytop (ISTE 13535)! Kumbağ, I. Manastır, sırtlarda, 16. vii.1974, N. ve E. Özhatay (ISTE 30440)! Şarköy, Uçmaktedere yakını, 19.vii.1992, E. Akalın (ISTE 64663)! **A2(A) Bursa:** Uludağ eteği, Kadiyayla kö., viii.1991, G. Tümen (ESSE 9405)! İnegöl, Kurşunlu'nun 3 km üst tarafında, kayalık yamaçlar, 19.vii.1992, G. Tümen (ESSE 9657)! Çekirge, 24.vi.1945, H. Bağda (ISTE 1270)! İstanbul: Şile, Çengilli kö., 170 m, 27.vi.1995, E.T. Fenercioğlu (MARE 4697) Şile, Korucuköy, 10 m, 25. vii.1995, E.T. Fenercioğlu (MARE 4726) Orhangazi-Yalova, Yalova'ya 8 km, 130 m, 5. vii.1985, E. Tuzlacı, M. Öksüz, (MARE 83)! Çınarcık, Esenköy, Bülbül deresi mevkii, M. Üstün (MARE 4167)! Çınarcık, Teşvikiye kö., Erikli yaylası arası, 30.vi.1991, E. Tuzlacı (MARE 3290)! Şile-İstanbul, Yeşilvadi kö. yakını, Şile'ye 4 km, 40 m, 22. vi.1996, E. Tuzlacı, E. Fenercioğlu, P. Eryaşar, F. Hırlak (MARE 4895)! Ömerli, 24. viii.1952, A. Berk (ESSE 5399)! *ibid.*, 24.viii.1952, T. Baytop, A. Berk (ISTE 3103)! Bayramoğlu, Yelkenkaya, İş Bankası tesisleri, tepede, 28.vii.1972, H. Argöksel (ISTE 23029, 23038)! İzmit: Kocaeli-Keltepe, Maşukiye'den 2 km, yol kenarı, çalılık, 250 m (MARA 1734)! **A2(E) İstanbul:** Tarabya, 9.ix.1964, A.R. Gürgen (ANK)! Halkalı, 26.vii.1927, B. Kasaplıgil (ANK)! Çatalca üstündeki yamaçlar, 160 m, 16.vii.1990, E. Tuzlacı (MARE 2696)! Karaburun-Terkos, Karaburun'dan 2-3 km, ormanlık alan, 17. vi.1985, E. Tuzlacı, M. Öksüz, F. Hırlak (MARE 1887)! Terkos gö. Kuzey yamaçları, baraj civarı, 21.x.1990, F. ve A.H. Meriçli (ISTE 62523)! **A3 Kocaeli:** Sapanca Gö. çevresi, 21.vii.1987, E. Tuzlacı (MARE 1187)! Keltepe, Maşukiye'den 3 km, yol kenarı, 250 m, 26.vii.1989, N. ve E. Özhatay, Ş. Akıncı (MUFE 1660)! Keltepe, Maşukiye K. yayla 7 km, yol kenarı, taşlı arazi, 550 m, 19.viii.1989, Ş. Akıncı (MUFE 1763)! Keltepe-Çeşme civarı, yol kenarı, 900 m, 17.ix.1989, Ş. Akıncı, E. Özhatay (MUFE 1790)! Keltepe, Maşukiye'den 6 km, çeşme, 500 m, 21.vii.1990, Ş. Akıncı (MUFE 2473)! **Sakarya:** Sapanca, 10.viii.1932, W. Kotte (ANK)! Sapanca, İ.Ü. Dinlenme Tesisleri civarı, 15.viii.1990, A.H. ve F. Meriçli (ISTE 62463)! **A4 Ankara:** Beytepe Kampüsü, 900 m, bozkır, inşaat yıkıntısı, 13.vii.1993, A.A. Dönmez 3526 (HUB 22648)! **Kastamonu:** Ilgaz da., K. Haçet Te., alpin veg., A. k. Kalker, ca. 2000 m, 20.vii.1981, Y.

Akman, E. Kurdakul, M. Demirörs (ISTE 48274)! **Zonguldak:** Safranbolu-Araç, Kayadağı kö., civarı, 450 m, yol kenarı, tepeler, 16.vi.1994, H. Malyer, M. Koşar, N. Ermin (ESSE 11014)! **A5 Amasya:** Yukarı Baraklı Köyü, Cıpcı Mevkii, ca. 1050 m, 26.vii.1987, step, S. Peker, 1616 (GAZI)! **A8 Rize:** Çamlıhemşin, Çat-Elevit Y., 1350-1800 m, 24.vii.1994, N. Tanker, M. Koyuncu, S. Kurucu, M. Coşkun, G. Yıldız (AEF 18863)! *ibid.*, 24.vii.1994, N. Tanker, M. Koyuncu, S. Kurucu, M. Coşkun, G. Yıldız (AEF 18836)! **B1 Balıkesir:** Bergama, Bergama-Kozak, Bergama'dan 10 km sonra kızılçam ormanı altı, 21.viii.1962, kayalar üstünde, K. Karamanoğlu 6748 (AEF)! Gönen, 21.viii.1984, Ş. Yıldırım 7488 (HUB 22604)! Edremit, Kazdağı güney yamacı, 27. ix.1965, A. Pamukçuoğlu (HUB 22647)! 10 km Kazdağ etekleri, ca. 330 m, 25.vii.1984, (EGE 17897)! Altınova Bağönü-Yabancılar, 700 m, 19.vi.1986, (EGE 19869)! Edremit, 1990, N. Ersan (ESSE 9555)! Bandırma, Bandırma pazarından, ix.1990, G. Tümen (ESSE 9554)! Edremit, Kazdağ, Eybek da. yöresi, Hacıhasanlar kö., 17.vii.1991, G. Tümen (ESSE 9564)! Kazdağı-Kapıkule, vii.1991, G. Tümen (ESSE 9552)! Savaştepe, Kölederesi kö., vii.1992, N.Ermin (ESSE 9756)! Balya, 3.vii.1992, G. Tümen (ESSE 9757)! Bandırma, Kapıdağ yarımadası, G. Tümen (ESSE 9567)! Bereketli kö., viii.1992, G. Tümen (ESSE 9817)! Edremit, Eybek da., zirveye çıkarken, 400 m, 23.vii.1992, G. Tümen (ESSE 9655)! Bigadiç-Alanköyü, 5.viii.1993, G. Tümen (ESSE 10428)! Balıkesir, G. Tümen (ESSE 9757)! Zeytinli, Kaz da., kilise alan, 500 m, yol kenarındaki dik, meyilli *Prunus* populasyonu altları, 23.ix.1995, N. ve E. Özhatay, Ege Tarımsal Araş. Mensupları (ISTE 71046)! Edremit, Zeytinli-Kapıkule yangın kulesi, 1000 m, 24.x.1996, Ş. Kültür, E. Akalın (ISTE 72780)! Kaz dağı, 9.vii.1960, A. Baytop (ISTE 6031)! Savaştepe, Sarıbeyler kö., Kıran te., 1.viii.1978, G. ve H. Çakırer (ISTE 41459)! Zeytinli'den Kazdağı'na çıkış yolu, 600 m, 30.vii.1971, A. Baytop (ISTE 20761)! Susurluk şeker fab. civarı, vi.1960, H. Benli (ISTE 6006, 6011)! Edremit, Kalkım, Eybek kulenin altı, 5 nolu bölme, N39°41' E27°08', 26.ix.2001, N. Sadıkoğlu (ISTE 81654)! Çanakale: Ayvacık, Dededağ, 12.vii.1996, Z. ve H. Erdemgil (ESSE 12325)! *ibid.*, 12.vii.1996, Z. Erdemgil (ESSE 12315)! Çamyayla, Maden civarı, 25.vi.1991, S. Bodur (ISTE 64081)! Küçükkuyu, Kızıtaşı, Nusratlı kö., 24.ix.2001, N. Sadıkoğlu (ISTE 81651)! İzmir: Çatalkaya, Eski İzmir'den çıkış, 29.vii.1982, (EGE 26509)! **Manisa:** Demirci, Söğütçü kö., Güldürlek ormanı dinlenme yeri, 1000 m, viii.1992, G. Tümen (ESSE 9982)! Alaşehir-Bozdağ, Azıtepe kö., 20.viii.1993, G. Tümen (ESSE 10169)! Soma, Yağcılı kö., üstlerindeki dağlar, *Quercus* açıklığı, 25.vii.1982, G. Çakırer (ISTE 49549)! **B2 Denizli:** Çivril, Akdağ, 6.x.1983, (EGE 25942)! İzmir: Kiraz, Emenler kö., 29.x.1992, G. Tümen (ESSE 9859)! **B3 Afyon:** Kayadibi, Boyralı kö., ekin alanı, 28.vii.1982, H. Malyer, R. İlarıslan (ESSE 2644)! **Konya:** Akşehir, Alanyurt kö., 25.vi.1996, G. Tümen (ESSE 12305)! **B6 Maraş:** Göksun, 20.vii.1969, (EGE 7321)! **C1 Aydın:** Kuşadası, Kalamaki deresi, 30.vii.1965, (EGE 6056)! Kuşadası, Kalamaki, 26.xi.1967, (EGE 5650)! Samsun D., Güzelçamlı üstleri, 130 m, 5.vii.1989, E. Tuzlacı (MARE 1930)! Nazilli, Topandağı üstleri, vii.1991, G. Tümen (ESSE 9569)! Kuşadası, Kuştur sırtları, 26.viii.1991, G. Tümen (ESSE 9556)! Söke-Milas karayolu, 800 m, yol kenarı, 26.viii.1991, G. Tümen (ESSE 9553)! Doğanhisar, 29.vi.1993, G. Tümen (ESSE 10565)! **İzmir:** Meryemana, 9.vi.1964, Regel, (ADA 73)! Selçuk-Germencik, Çamlık kö. çevresi, ağaçlandırma sahası, 310 m, 6. vii.1989, E. Tuzlacı (MARE 1982)! **Muğla:** Bodrum, Güvercinlik, 01.i.1950, M. Polat

(IZEF 1751)! **C2 Aydın:** Sultanhisar, 01.1.1950, M. Polat (IZEF 1770)! Bozdoğan, Mardan da., c. 750 m, 28.1x.1965, (EGE 6057)! Çine, Karpuzlu, Tekeler kö. civarı, G. Tümen (ESSE 6842)! **Denizli:** Dinana de., Başalan mevkii, yolun sol yamacındaki kayalıklar, 23.vii.1992, F. ve A.H. Meriçli (MARE 3794)! Honaz da., Arpacık Y., 1380 m, 29.vi.1972, E. Tuzlacı (ISTE 22795)! Honaz da., kireç ocağı, *Pinus altı*, 1090 m, 20.1x.1972, E. Tuzlacı (ISTE 23385)! Honaz da., Döngelli tepeden Honaza inen yol üstü, 780 m, 21.vii.1973, E. Tuzlacı (ISTE 26460)! Honaz da., Honaz-Menteş, 23.vii.1973, E. Tuzlacı (ISTE 26522)! Honaz da., Başalan mevkii, 700 m, 23.viii.1973, E. Tuzlacı (ISTE 26641)! Honaz da., Kabardıç Y., 1700 m, 8.x.1982, E. Tuzlacı (ISTE 49732)! Honaz da., Papazlık Y., 1450 m, 8.x.1982, E. Tuzlacı (ISTE 49743)! Babadağ, above Kadıköy, 1200 m, 23.viii.1950, P.H. Davis 18418 (ISTE 52295)! **Muğla:** Köyceğiz, 12.vii.1948, H. Bağda s.n. (ANK)! Sandras dağ, P.H. Davis, 13636 (ANK)! Ağla, Sandras Dağ, 610 m, P.H. Davis 13589 (ANK)! Taş ocağı, 900 m, 13.vii.1947, Davis et K. Karamanoğlu 13230 (ANK)! Ağla, Sandras Da., 610 m, 25.vii.1947, (EGE 27259)! Yatağan, Yumaklı mevkii, ca. 1250 m, 25.xii.1966, (EGE 9751)! Fethiye, Yanıklar kö. civarı, 10.viii.1991, G. Tümen (ESSE 9565)! Fethiye, Babadağ, 20.vii.1994, G. Tümen (ESSE 10764)! *ibid.*, 1500 m, 8.viii.1999, G. Tümen (ESSE 13392)! Sandras da., Panguduz, Karadoruğun güneybatı yamaçları, 1400 m, 13.vii.1978, N. ve E. Özhatay (ISTE 40602)! **C3 Antalya:** Antalya-Konaklı kö., 1991, K.H.C. Başer (ESSE 9694)! Alanya, Konaklı kö., viii.1991, K.H.C. Başer (ESSE 9692)! *ibid.*, 20.viii.1994, K.H.C. Başer (ESSE 11855)! **Isparta:** Kuyucalı Dağ, Darıbükü, 1400 m, 30.vii.1949, P.H. Davis 15893 (ANK)! **C4 Karaman:** Ermenek, Çavuş köyü, 7.1x.1973, (AEF 18152)! Ermenek, Sarıvadi kö., ca. 1400 m, 7.viii.1998, (EGE 19652, 19653)! Ermenek, Ulama mevkii, ca. 1500 m, 7.viii.1998, (EGE 19654, 19655)! **Konya:** Hadim, Aladağ kö., Balaban mevkii, ağabeyes açıklıkları, ca. 1600 m, 4.1x.1987, M. Serin (MUFE 1141)! **Mersin:** Anamur, Anamur'dan Kazancı'ya, Kızılalan mevkii, 1400 m, 11.x.1983, H. Sümbül 2510 (HUB 22605)! Çamlıyayla, Papazın Bahçesi, 820-850 m, 6.1x.1995, N. Özhatay (ISTE 71245)! Çamlıyayla, Papazın Bahçesi girişi, 820 m, yol kenarındaki sırtlar, 6.1x.1995, N. Özhatay (ISTE 71233)! Tarsus, Darıpınarı kö., köy civarındaki tepelerde, 18.vii.1985, T. Ersöz 3014 (ISTE 55631)! **C5 Adana:** Karsantı, Pos Ormanları, Meydan bölgesi, Alıç Yaylası mevkii, anakaya kalker, 1440 m, 12.vii.1974, E. Yurdakulol 1502 (ANK)! **Mersin:** Tarsus, Namrun, 1200 m, 11.viii.1972, Y. Akman 7656 (ANK)! Gülek-Maden yolu, Kızıllarlık mevkii, 2000 m, 22.vii.1995, K.H.C. Başer 1256, H. Duman, A. Altıntaş (ESSE 11604)! Tarsus, Orman Araştırma Enstitüsü Müdürlüğü-kültür-30.vi.2004, N. Sadıkoğlu (ISTE 81705)! **Niğde:** Ulukışla, Alihoca kö., *P. brutia* açıklığı, 1300 m, 28.vii.1977, S. Erik 2991 (HUB)!