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# **Allium aeginiense Brullo, Giusso & Terrasi (Alliaceae), a new species from Greece**

Salvatore Brullo, Gianpietro Giusso del Galdo & Maria Carmen Terrasi

## **Abstract**

BRULLO, S., G. GIUSSO DEL GALDO & M. C. TERRASI (2008). *Allium aeginiense* Brullo, Giusso & Terrasi (Alliaceae), a new species from Greece. *Candollea* 63: 197-203. In English, English and French abstracts.

*Allium aeginiense* Brullo, Giusso & Terrasi (Alliaceae), a new species from Meteora in Thessaly (Greece), is described and illustrated. Its karyology, ecology and relationships with *Allium hirtovaginum* P. Candargy are examined.

## **Key-words**

ALLIACEAE – *Allium* – Greece – Taxonomy – Karyology

## **Résumé**

BRULLO, S., G. GIUSSO DEL GALDO & M. C. TERRASI (2008). *Allium aeginiense* Brullo, Giusso & Terrasi (Alliaceae), une nouvelle espèce de Grèce. *Candollea* 63: 197-203. En anglais, résumés anglais et français.

*Allium aeginiense* Brullo, Giusso & Terrasi (Alliaceae), une nouvelle espèce des Météores en Thessalie (Grèce), est décrite et illustrée. Sa caryologie, son écologie et ses affinités avec *Allium hirtovaginum* P. Candargy sont examinées.

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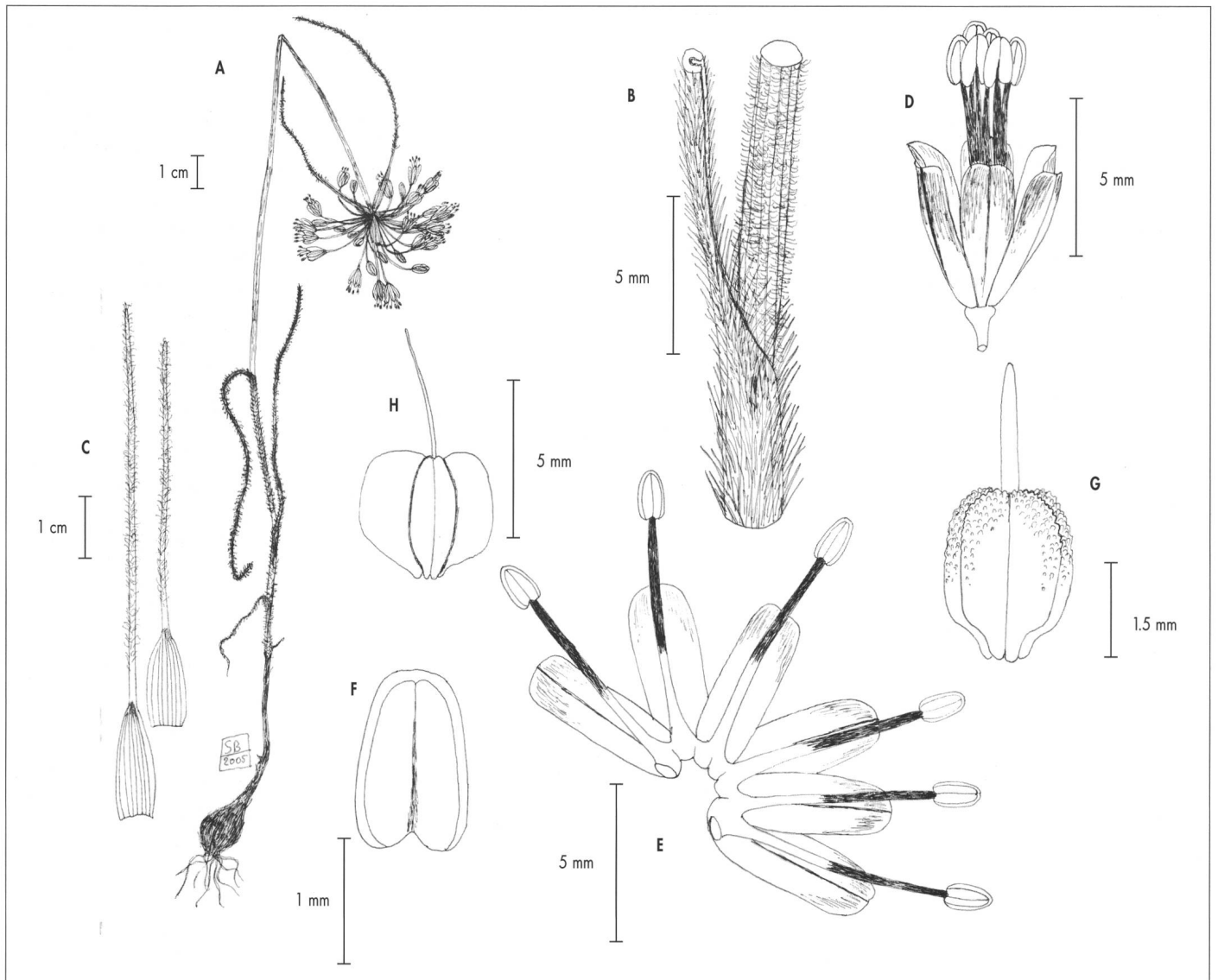
### Introduction

In the frame of taxonomic investigations on the genus *Allium* L. in Greece (BRULLO & al., 1992, 1993, 1997, 1998, 1999, 2001, 2003; BRULLO & TZANOUDAKIS, 1989, 1994), a very peculiar population growing on rocky places of Meteora (Kalambaka – Thessaly) is examined. It clearly belongs to the *Allium* sect. *Codonoprasum* Rchb. for the occurrence of two persistent, evidently veined spathe valves with long appendage, longer than the inflorescence, perigon campanulate, stamens simple, and ovary without showy nectaries. Besides, due to its habit and certain morphological features (hairiness of the leaves and spathe valves, exerted stamens, etc.) it shows close relationships with *A. hirtovaginum* P. Candargy widespread in the

eastern Mediterranean area. Meaningful morphological differences allow to distinguish the population at issue and therefore it is described as species new to science.

### Materials and methods

The morphological study was based on literature data and herbarium investigations as well as on field surveys. Herbarium specimens of *A. hirtovaginum* and allied species, preserved in B, BM, C, CAT, FI, G, M, P, W and WU, were examined for taxonomic comparison, while living plants, collected in the type locality (Moria near Mitilini, Lesbos), were cultivated in the Botanical Garden of Catania.



**Fig. 1.** – *Allium aeginiense* Brullo, Giusso & Terrasi. **A.** Habit; **B.** Leaf indumentum; **C.** Spathe valves; **D.** Flower; **E.** Perigon and stamen; **F.** Anther; **G.** Ovary; **H.** Capsule. [Brullo & al. s.n., CAT] [Drawn by Salvatore Brullo]

Karyological analyses were performed on mitotic plates from root tip cells of cultivated bulbs, pre-treated with 0.3% colchicine water solution at room temperature, fixed in Carnoy and stained according to Feulgen technique. Metaphase handlings and chromosome measures were made using the image analysis systems IKAROS 4.6 (Metasystem) and Zeiss Axio-vision 5.1. Karyotyping was worked out by a specific software Cromolab® 1.1 (BRULLO, 2002-2003) for the recognition of homologues, couple ordering, chromosome classification and karyotype formula based on the centromere position (LEVAN & al., 1964; TZANOUDAKIS, 1983).

## Results

*Allium aeginiense* Brullo, Giusso & Terrasi, **spec. nova** (Fig. 1)

**Typus:** GREECE. **Thessaly:** Meteore (Kalambaka) substrati conglomeratici presso il Monastero di Megalo Meteoro, 8.VII.2004, Brullo, Bacchetta, Giusso & Guarino s.n. (holo-: CAT).

*Ab Allio hirtovagino bulbo 15-22 mm longo, pilis foliorum usque ad 1,8 mm longis, foliis scapo brevioribus, valvis spathae ambabus 7-nervis, tepalis truncatis, laevibus superne, 1.6-2 mm latis, filamentis staminalium 6-7 mm longis, ovario ellipsoideo, tuberculato superne, 2.1-2.4 mm longo, 1.9-2 mm lato, stylo albido, differt.*

*Bulb* ovoid, 15-22 × 9-11 mm, with feeble fibrous tunics, the outer ones dark-brown, the inner ones pale-brown. *Stem* 20-30 cm tall, cylindrical, glabrous, erect, covered for  $\frac{1}{2}$ - $\frac{1}{3}$  of its length by the leaf sheaths. *Leaves* 3-4, 5-10 cm long, 1-1.5 mm wide, shorter than scape, flat, green, completely hairy, with hairs 0.2-1.8 mm long. *Spathae* persistent, densely hairy, at least in the appendages, with two valves unequal, longer than the inflorescence, both 7-nerved, the larger one 6-12 cm long, the smaller one 3.5-7 cm long. *Inflorescence* lax and expanded, 4.5-5 cm in diameter, 20-40 flowered, with unequal pedicels, 15-25 mm long. *Perigon* campanulate with tepals equal, pink-purplish, tinged with purple, rectangular, smooth, truncate at the apex, 5-5.5 mm long and 1.6-2 mm wide, midrib green-purplish. *Stamens* exserted from perigon, with simple filaments, subequal, purplish above and white below, 6-7 mm long, below connate into an annulus 0.6-0.8 mm high. *Anthers* yellow, elliptical, 1.5-1.6 mm long, 0.8-0.9 mm wide, rounded at the apex. *Ovary* ellipsoid, green, tuberculate above, 2.1-2.4 mm long, 1.9-2 mm wide, slightly throttled below. *Style* white, 0.8-1 mm long. *Capsule* trivalved, sub-globose, 3.8-4.2 × 4.2-4.4 mm, green.

*Etymology.* – The specific epithet refers to “Aeginium”, the ancient name of the town of Kalambaka.

*Distribution, ecology and conservation status.* – *Allium aeginiense* is localized on the top of Megalo Meteora (Kalambaka, Central Greece). It grows on shady rocky places at an



Fig. 2. – *Allium aeginiense* Brullo, Giusso & Terrasi. A. Metaphasic plate ( $2n = 16$ ); B. Karyogram.

altitude of ca. 600 m, where it colonizes flat or gentle sloping stands characterized by a very feeble accumulation of soil. It is a member of an herbaceous vegetation dominated by several therophytes and hemicriptophytes. The substrate is represented by Oligo-Miocene conglomerates of lacustrine origin. This very few-numbered population is really circumscribed, and mixed to scattered individuals of another endemic garlic, namely *A. meteoricum* Halácsy, which is exclusive of the Meteora area (BRULLO & al., 2001).

At present, *A. aeginiense* can be considered as a threatened species at high risk of extinction as a result of the low number of individuals (less than 50) circumscribed to a very small stand. Therefore, since this species is seriously endangered by several human activities, such as tourist facilities, we deem it should be added to the “Red List of Threatened Species” as critically endangered (CR). Based on the criteria adopted by IUCN (2001, 2003, 2006), it is proposed its inclusion in the following category: CR B1a, B2a, D.

*Karyology.* – The investigated living material of *A. aeginiense* has a chromosome complement  $2n = 16$  (Fig. 2A), which is quite common within the *Allium* sect. *Codonoprasum*. Its karyotype is really regular and homogeneous (Fig. 2B), and it

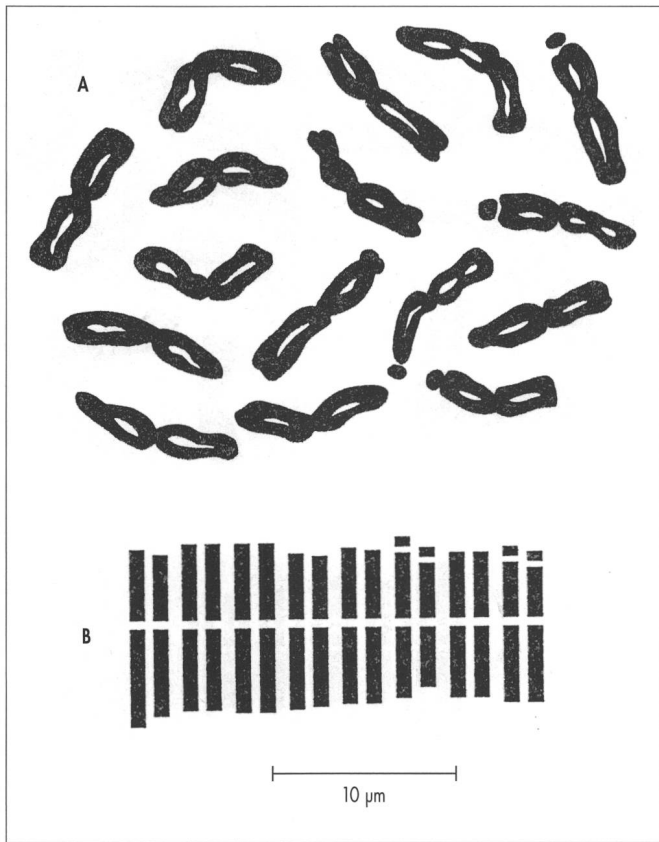


Fig. 3. – *Allium hirtovaginum* P. Candargy. A. Metaphasic plate ( $2n = 16$ ); B. Karyogram.

is characterized by nearly all chromosomes metacentric with the exception of one pair which is submetacentric and satellited. The chromosome formula is  $2n = 2x = 16: 14m + 2msm^{sat}$ . The same chromosome number was detected also for the allied species *A. hirtovaginum* on material collected in the type locality (Fig. 3A), but whose karyotype is characterized by four satellited chromosomes (Fig. 3B).

*Leaf anatomy.* – The leaf cross section of *A. aeginiense* shows a flat outline, laterally rounded. The epidermis is covered by a well developed cuticle on which several unicellular hairs are inserted. The numerous stomata are distributed along the whole perimeter of the leaf. The palisade tissue is regular, compact, two-layered on the abaxial face and one-layered on the adaxial one. The spongy tissue is limited to the peripheral belt, while it is vacuolate in the middle part. Several secretory canals occur in the outermost part of the spongy tissue. The vascular bundles are 18. Among the 13 abaxial, 3 are bigger, while the 5 adaxial are smaller (Fig. 4).

*Notes.* – As already said, *A. aeginiense* belongs to the *Allium* sect. *Codonoprasum* and, within this section, it seems to be more similar to *A. hirtovaginum*, species described from Moria (Lesbos) by CANDARGY (1897) (Fig. 5). In particular, both these species share the same habit, hairiness of the leaves and spathe valves, and stamens exserted with filament purplish above. Several morphological features allow to distinguish these two species. Based on the morphological comparison of many cultivated plants, *A. hirtovaginum* differs from

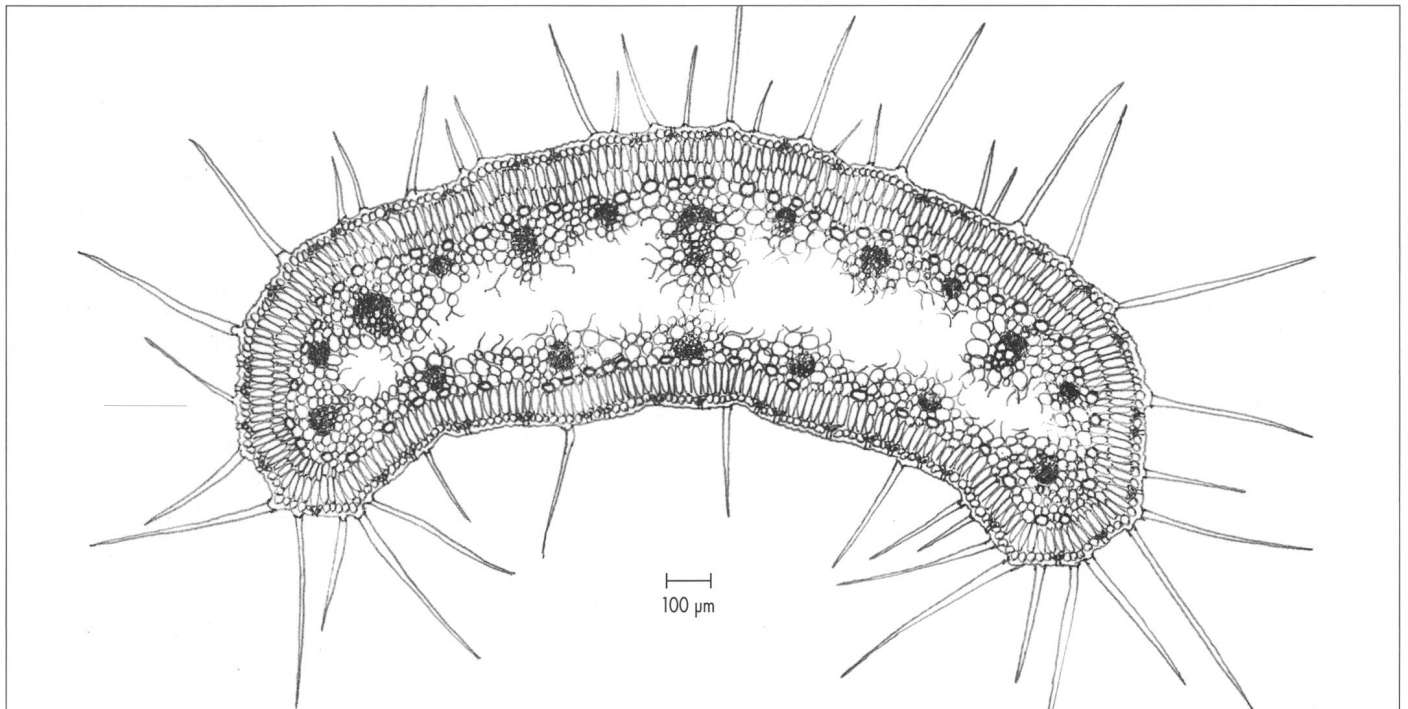
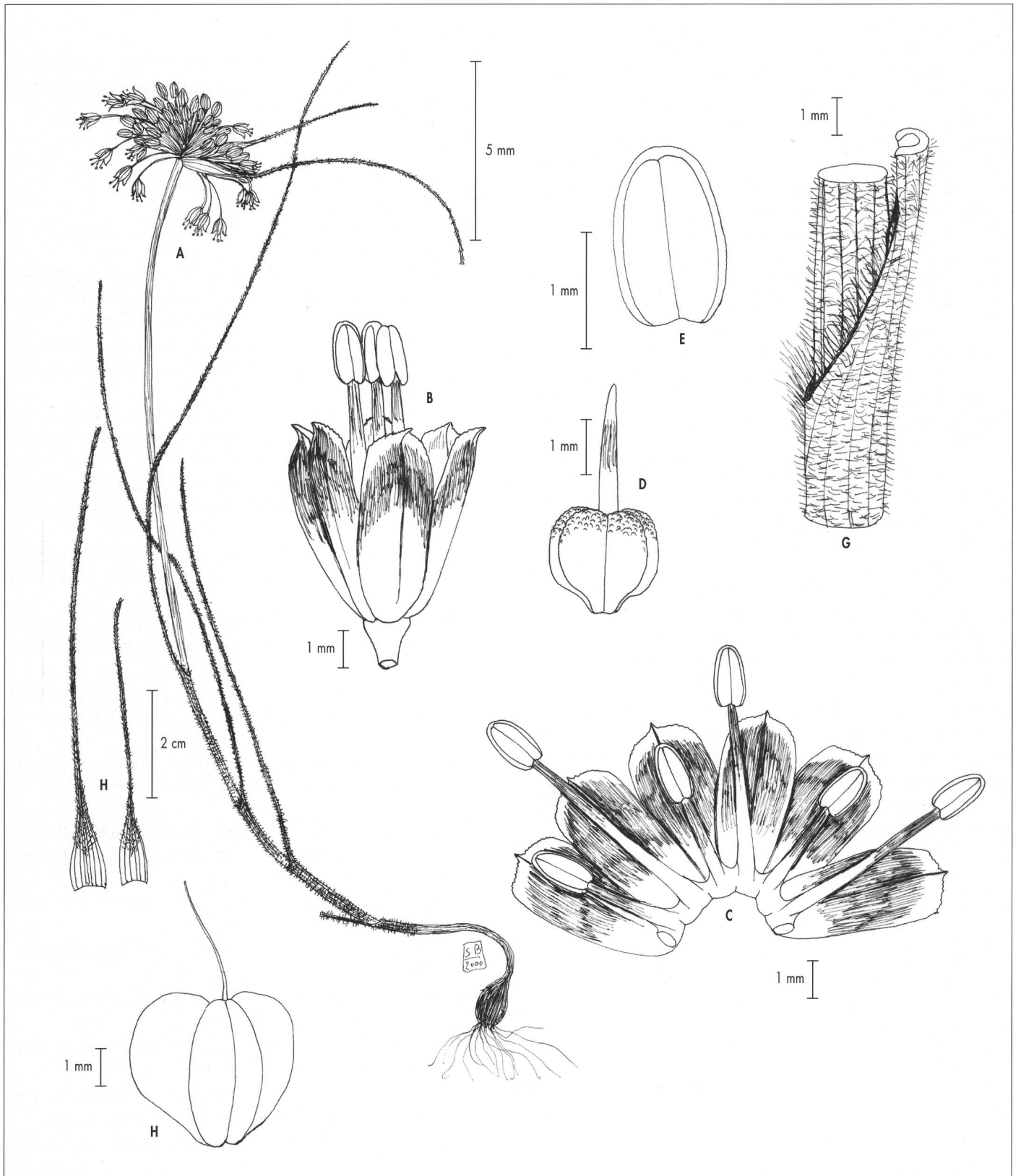


Fig. 4. – *Allium aeginiense* Brullo, Giusso & Terrasi. Leaf cross section.



**Fig. 5.** – *Allium hirtovaginum* P. Candargy. **A.** Habit; **B.** Flower; **C.** Perigon and stamen; **D.** Ovary; **E.** Anther; **F.** Capsule; **G.** Leaf indumentum; **H.** Spathe valves. [Brullo s.n., CAT] [Drawn by Salvatore Brullo]

*A. aeginiense* in having bulb 10-15 × 7-10 mm, outer tunics coriaceous and brown-purplish, leaves up to 18 cm long, with hairs 0.1-0.2 mm long (only on the sheath throat there are hairs up to 1 mm long), spathe valves hairy above, the bigger one 5-7-nerved, the smaller one 5-nerved, tepals tinged with dark-purple, 2-2.5 mm wide, apiculate at the apex, minutely erose-dentate above, stamen filaments lilac above, unequal, the outer ones 2-2.5 mm long, included, the inner ones 3-5 mm long, exerted, ovary subglobose, slightly papillose above, style 2 mm long, purplish in the middle, capsule obovoid (Fig. 5). Moreover, remarkable differences from the ecological, phenological and karyological point of view allow a further differentiation of *A. hirtovaginum* from *A. aeginiense*. In fact, *A. hirtovaginum* is an heliophilous xerophyte, growing close to sea within thermo-xerophilous phrygana dominated by *Sarcopoterium spinosum* (L.) Spach., and flowering from late May to early June. Besides, the karyotype of *Allium hirtovaginum* is characterized by the occurrence of two pairs of chromosome satellited (Table 1).

Another species showing a certain affinity with *A. aeginiense* is *A. pilosum* Sm. which is circumscribed to some Aegean islands. Similarly to *A. aeginiense*, this species is characterized by hairy leaves and spathe valves, and exerted stamens with filaments purplish above, but it differs in having a smaller size, shorter spathe valves, 3-7-nerved, hemispherical inflorescence with shorter pedicels, shorter and uniformly lilac-purplish tepals, shorter stamen filaments, smaller ovary, style suffuse with purple below, and smaller capsule (BRULLO & al., 2001).

Basing on morphological, phenological, chorological, and ecological observations, it is likely that *A. aeginiense* arose from the adaptation to more mesic ecological conditions, and subsequent geographical isolation, as testified both by its late flowering time (observed also on cultivated specimens) and its exclusive localization on shady stands.

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**Table 1.** – Comparative scheme of the main features between *Allium aeginiense* Brullo, Giusso & Terrasi and allied species.

	<i>A. pilosum</i> Sm.	<i>A. aeginiense</i>	<i>A. hirtovaginum</i> P. Candargy
Bulb size [mm]	10-12 × 8-10	15-22 × 9-11	10-15 × 7-10
Outer tunics	coriaceous	fibrous	coriaceous
Stem length [cm]	2.5-20	20-30	10-25
Leaf number	3-4	3-4	4
Leaf max. length [cm]	13	10	18
Leaf width [mm]	1-1.5	1-1.5	1-1.5
Leaf hairs [mm]	0.8-1.2	0.2-1.8	0.1-0.2(-1)
Spathe nerves	5-7	7	5-7
Larger spathe valve length [cm]	1-4	6-12	6-12
Smaller spathe valve length [cm]	1-1.5	3.5-7	3.5-7
Pediceal length [mm]	5-15	15-25	10-25
Inflorescence flowers	15-30	20-40	20-40
Perigon colour	lilac-purplish	pink-purplish	pink-purplish
Tepal shape	elliptical	rectangular	elliptical
Tepal apex	smooth and apiculate	smooth and truncate	denticulate and apiculate
Tepal length [mm]	3.5-4.5	5-5.5	4.5-5
Tepals width [mm]	1.8-2	1.6-2	2-2.5
Stamen filament colour	pink-purplish for 4/5	purplish above	lilac above
Stamen filament size	unequal	subequal	unequal
Stamen filament length [mm]	2-4	6-7	2-5
Annulus height [mm]	0.6-0.8	0.6-0.8	0.7-0.8
Anther size [mm]	1.2-1.3 × 0.5-0.7	1.5-1.6 × 0.8-0.9	1.5-1.6 × 0.7-0.8
Ovary shape	subglobose-ovoid	ellipsoid	subglobose
Ovary size [mm]	1.2-1.8 × 1.5-1.7	2.1-2.4 × 1.9-2	1.5-1.6 × 1.8-2
Style colour	purplish below	white	purplish in the middle
Style length [mm]	1.4	0.8-1	2
Capsule shape	subglobose	subglobose	obovoid
Capsule size [mm]	3.2 × 2.8	3.8-4.2 × 4.2-4.4	3.8-4 × 4-4.2



