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Allium symiacum (Amaryllidaceae), a new species from Symi Island (SE Aegean, Greece)

Abstract: Allium symiacum Galanos & Tzanoud., from the island of Symi (SE Aegean, Greece), is described as a species new to science. It is an autumn-flowering, single-island endemic species of A. sect. Codonoprasum (Amaryllidaceae) and is classified as Critically Endangered according to IUCN Red List categories and criteria. Considering the morphological and karyological characters of the new species, its possible relationships to other autumnal species of A. sect. Codonoprasum distributed in the E Mediterranean area are discussed.

Key words: Aegean, Allium, Amaryllidaceae, Allium sect. Codonoprasum, chromosome number, Dodecanese, Greece, karyology, new species, Symi, taxonomy

Introduction

Allium L. (Amaryllidaceae) is considered as one of the most species-rich genera of flowering plants, as it comprises more than 960 species (Govaerts & al. 2005–2014). In Flora europaea (Stearn 1980; see also Stearn 1978), 47 Allium species were recorded as occurring in Greece, and the Greek area was regarded as an evolutionary centre for the genus (Stearn 1981; Tzanoudakis & Vosa 1988). This view is further supported by newer floristic data, according to which, the genus Allium is represented in Greece by more than 100 species (Dimopoulos & al. 2013; Brullo & al. 2015; Tzanoudakis & Trigas 2015; Trigas & al. 2017). The doubling of species number within the last four decades, mainly because of the description of numerous new species, indicates the amplitude of diversity of the genus in Greece.

It is worth noting that among these new Allium taxa, two, often overlapping, groups are well represented. The first one consists of species of A. sect. Codonoprasum Rchb., the members of which show a remarkable diversity regarding their morphology, ploidy level, habitat traits and flowering period. The second group consists of species particularly characterized by an autumn-flowering period and a life cycle in which the dormancy phase is almost absent (Tzanoudakis & Kypriotakis 1993).

The Allium species described here from the island of Symi is a member of A. sect. Codonoprasum, autumn-flowering and was collected in the framework of the floristic explorations and studies of the authors in the Aegean islands.

The island of Symi was visited by the first author in November 2015. During the fieldwork, a small Allium population, with some individuals still in flower, was found growing on a calcareous coastal slope. The autumnal flowering period and the obvious morphological differences of the individuals from all known autumn-flowering Allium species of Greece indicated an interesting
new finding. Living bulbs and herbarium specimens were collected for cultivation and further studies. Careful and thorough examination of the collected material lead us to the conclusion that it is distinct from all other members of A. sect. *Codonoprasum* and it is described here as a species new to science.

Symi is one of the small but inhabited islands of the Dodekanisa island complex (Dodecanese, SE Aegean region) and it is located 22 km N of Rodos (Rhodes) and 6.75 km W of the nearest Turkish coast (36°36'N, 27°50'E, Fig. 1). It covers an area of 58 km², has a coastline of 84 km and includes five main settlements with a total population of c. 2500 permanent inhabitants. It is mostly mountainous and rocky, and its highest elevation (Vigla peak) is 616 m. According to the climatic diagrams of the Hellenic National Meteorological Service (http://www.hnms.gr), the climate of the island is similar to that of Rodos, i.e. semi-arid Mediterranean, with short, mild and wet winters, followed by long, hot and dry summers.

The vegetation of the island mainly consists of phrygana communities and remnants of pre-existing conifer (*Cupressus* L. and *Pinus* L.) woodlands, as well as sclerophyllous and deciduous forests. The latter, however, are nowadays limited by human impact to the foot of the hills and the valleys (Kagiampaki 2011). According to the literature (Carlström 1987; Chilton 1999; Galanos 2016; Strid 2016), the vascular flora of Symi known until the present study amounts to more than 600 species.
Material and methods

The floristic exploration in the island of Symi, as well as the collection of herbarium specimens and living bulbs, took place in November 2015 and October 2016, after obtaining official permission (see Acknowledgements). The bulbs were cultivated at the experimental botanical garden of the University of Patras for karyological and morphological studies. For the karyological analyses, root tips from potted bulbs were pre-treated in a-bromo-naphthalene for c. 8 hours at 4°C. Fixation, staining and chromosome measurements and construction of the karyogram follow Tzanoudakis (1983).

Results

Allium symiacum Galanos & Tzanoud., sp. nov. – Fig. 2 & 3.
Holotype: Greece, Nomos (Prefecture) of Dodekanisa (SE Aegean region), Island of Symi, near Symi harbour, c. 36°37'N, 27°50'E, 30 m, rocky calcareous coastal slopes with shrubs, phrygana, geophytes and annuals, 14 Nov 2015, Galanos 15.114 (UPA; isotypes: herb. Galanos).

Diagnosis — Allium symiacum is an autumn-flowering species of A. sect. Codonoprasum. It differs from other autumn-flowering species of the A. paniculatum subgroup known from Greece mainly by its smaller perianth with exserted stamens and from the species of the A. flavum L. and A. stamineum Boiss. subgroups (which are also characterized by exserted stamens) by its greenish white flowers appearing in autumn.

Description — Geophyte, perennial. Bulb ovoid 1.2–1.5 × 2–2.5 mm; tunics brown to blackish brown, coriaceous. Stem ascending to erect, 30–60 cm tall, glabrous. Leaves 4 or 5, sheathing ¾–¾ of stem, usually longer than scape, fistulose, slightly canalicate, c. 2 mm wide, glabrous. Spathe persistent, with 2 opposite and unequal valves, longer one 10.5–12.5 cm, 6- or 7-nerved, much longer than umbel, shorter one 2.5–3 cm, 4- or 5-nerved, equaling or longer than umbel. Inflorescence lax, fastigiate, (17–)20–35(–42)-flowered; bostryces numerous; pedicels erect, green, unequal, 10–30 mm. Perigon cup-shaped to campanulate; tepals greenish white with darker green midvein, obovate-elliptic, equal, 4.2–4.5 × 2.2–2.4 mm, apex rounded. Stamens exserted from perigon; filaments white, connate at base into an annulus c. 1 mm long; anthers yellowish white. Ovary light green proximally, papillos and dark green distally, obovoid, apex truncate; style white, c. 2 mm long; stigma white, globose. Capsule green, subglobose, narrower at base, 3.5–4 × 4–5 mm, 3-valved. Seeds black, c. 3 mm. Chromosome number 2n = 16.

Phenology — Flowering from late September to the middle November; the first mature seeds appear almost one month later, from October to late November.
Fig. 3. *Allium symiacum* – A: inflorescence; B: flower; C: natural habitat; D: bulb and outer bulb tunics; E: habit; note last year’s leaves sheathing much more than ¾ of stem and new leaves already well developed. – All photographs by Ch. Galanos: A, B, C & E at the type locality on 14 Nov 2015; D from the holotype specimen.
Etymology — The specific epithet is derived from the Greek adjective symiakós (συμιακός), which means originating from the island of Symi, where the species was discovered.

Distribution, habitat and ecology — Allium symiacum is currently known only from the type locality on Symi and should be considered as a single-island endemic. It grows on calcareous stony coastal slopes (Fig. 3C, E). The accompanying taxa of the species of this section (viz. A. aegilicum Tzou., A. apolloniensis Biel & al., A. archeotrichon Brullo & al., A. dirphianum Brullo & al., A. orestis Kalpoutz. & al., A. phitosianum Brullo & al., A. platakisii Tzou. & Kypr., A. rausii Brullo & al. and A. tardans Greuter & Zahar.), A. symiacum has a cup-shaped, rather than campanulate, perigon and its stamens (both filaments and anthers) are exserted from the perigon (Fig. 3A, B).

Allium symiacum is also well distinguished from A. dirphianum, A. orestis, A. phitosianum, A. rausii and A. tardans by the size and colour of the flowers: in A. symiacum the tepals are shorter than 5 mm and greenish white with a dark green midvein (Fig. 3B), whereas in the former species the tepals are longer than 5 mm and mostly in shades of pink, purple or brown.

Considering the white colour in its flowers, Allium symiacum could also be compared with the autumn-flowering Aegean species A. aegilicum, A. apolloniensis, A. archeotrichon and A. platakisii, which, however, are well differentiated from the new species on the basis of their campanulate to semi-cylindric and longer perigon.

Although Allium symiacum is characterized by exserted stamens, it is well differentiated from the Greek species of A. sect. Codonoprasum that have similar flowers and inflorescence, i.e. the species of the A. flavum and A. stamineum groups. Those species have leaves sheathing less than ½ of the stem, perigon yellowish, pinkish or brownish, ovary more or less globose and often stipitate, and they flower in spring or early summer.
Allium symiacum shows also some similarity to A. tardiflorum Kollmann & Shmida, another autumn-flowering species described from Israel, mainly in the shape of the inflorescences. The later species, however, is distinct in its much longer flowers and the almost unilateral spathe valves (Kollmann & al. 1990).

On the basis of the above comparisons, Allium symiacum should be considered as a species with a well distinguished taxonomic position among the Greek species of A. sect. Codonoprasum: it is the only species with exerted stamens in the autumn-flowering subgroup of this section and at the same time it is the only autumn-flowering species among those species of this section that have exerted stamens. Moreover, A. symiacum is characterized by leaves sheathing more than ¾ of the stem and greenish white perianth segments less than 5 mm long. Leaves sheathing more than ¾ of the stem and a life cycle in which dormancy is almost absent are characters that coexist in a few other Greek Allium species belonging to three different sections, viz. A. archeotrichon and A. makarianum C. Brullo & al. (A. sect. Codonoprasum), A. callimichon Link and A. riti Iatrou & Tzanoud. (A. sect. Brevispatha Vals.) and A. chamaeaphathum Boiss. (A. sect. Allium). Characters like these have been considered as biological traits and adaptations in the arid climatic conditions prevailing in the Mediterranean area during the late Tertiary, i.e. more than 5 million years ago, and the species concerned have been considered as relict floriastic elements (Greuter 1979; Kollmann & al. 1990; Tzanoudakis & Kypriotakis 1993, 2008; Brullo & al. 1997; Tzanoudakis 2000).

Taking into consideration the morphology (leaf sheaths) and the life cycle (autumn-flowering/no dormancy) of Allium symiacum, it could be also considered as a relict element. This aspect is further supported by the symmetrical diploid karyotype and the restricted distribution range. Plant taxa characterized by small size, an unusual flowering period and small population size, however, are rather under-collected and as a consequence their distribution range is often underestimated. This is the case of some Allium species previously considered endemic to Greece, viz. A. aeginiense Brullo & al., A. brussalisis Tzanoud. & Kypr., A. guicciardii Hdlr. and A. pilosum Sm., which have been recently reported from Asia Minor (Koçyiğit & al. 2014).

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References

Brullo S., Pavone P. & Salmeri C. 1997: Allium oporinantherum (Alliaceae) a new species from the NW Mediterranean area. – Anales Jard. Bot. Madrid 55: 297–302

Brullo S., Pavone P. & Salmeri C. 2015: Biosystematic researches on Allium cupani group (Amaryllidaceae) in the Mediterranean area. – Fl. Mediterr. 25 (Special issue): 209–244

Carlström A. 1987: A survey of the flora and phytogeography of Rodhos, Simi, Tilos and the Marmaris Peninsula (SE Greece, SW Turkey). – Lund: Ph.D. thesis, University of Lund.

Chilton L. 1999: Plant list for Symi (Greece: East Aegean Islands). Ed. 1 (slightly revised 2000–2010). – Retford: Marengo.

Dimopoulos P., Raus Th., Bergmeier E., Constantinidis Th., Iatrou G., Kokkinsi S., Strid A. & Tzanoudakis D. 2013: Vascular plants of Greece: an annotated checklist. – Berlin: Botanic Garden and Botanical Museum Berlin-Dahlem; Athens: Hellenic Botanical Society.

Englera 31.

Galanos Ch. 2016: Reports 110–118. – Pp. 442–444 in: Vladimirov V. & Tan K. (ed.), New floristic records in the Balkans: 31. – Phytol. Balcan. 22: 429–467

Govaerts R., Kington S., Friesen N., Fritsch R., Snijman D. A., Marcucci R., Silverstone-Sopkin P. A. & Brullo S. 2005–2014: World checklist of Amaryllidaceae. – Published at http://apps.kew.org/wcsp/reportbuilder. [accessed 30 Mar 2017].

Greuter W. 1979: The origin and evolution of island floras as exemplified by the Aegean archipelago. – Pp. 81–106 in: Bramwell D. (ed.), Plants and islands. – London & New York: Academic Press.

IUCN 2012: IUCN Red List categories and criteria: version 3.1, ed. 2. – Gland & Cambridge: IUCN.

Kagiampaki A. 2011: Contemporary phytogeographical analysis in the central and southern Aegean archipelago [PhD Thesis, in Greek, with English summary]. – Iraklio: Department of Biology, University of Crete.

Koçyiğit M., Özhatay N. & Kaya E. 2014: New species and new records for Allium (sect. Codonoprasum) from Turkey. – Pp. 514–524 in: Kaya E., Geophytes
Yalova: Atatürk Central Horticultural Research Institute [edition no. 96].

Kollmann F., Shmida A. & Cohen O. 1990: *Allium tardiflorum* Kollmann & Shmida: a new autumn-flowering species. – Herbetia 46: 23–32.

Stearn W. T. 1978: European species of *Allium* and allied genera of *Alliaceae*: a synonymic enumeration. – Ann. Mus. Goulandris 4: 83–198.

Stearn W. T. 1980: *Allium* L. – Pp. 49–70 in: Tutin T. G., Heywood V. H., Burges N. A., Moore D. M., Valentine D. H., Walters S. M. & Webb D. A. (ed.), Flora europaea 5. – Cambridge: Cambridge University Press.

Stearn W. T. 1981: The genus *Allium* in the Balkan Peninsula. – Bot. Jahrb. Syst. 102: 201–213.

Strid A. 2016: Atlas of the Aegean flora. Part 1: text & plates. Part 2: maps. – Berlin: Botanic Garden and Botanical Museum Berlin, Freie Universität Berlin. – Englera 33(1, 2).

Trigas P., Kalpoutzakis E. & Constantinidis Th. 2017: Two new *Allium* (A. sect. *Cupanioscordum*, *Amaryllidaceae*) species from Greece. – Phytotaxa 297: 179–188.

Tzanoudakis D. 1983: Karyotypes of ten taxa of *Allium* sect. *Scorodon* from Greece. – Caryologia 36: 259–284.

Tzanoudakis D. 1992: Karyotype variation and evolution in the Greek *Allium*. – In: Hanelt P., Hammer K. & Knüpfler H. (ed.), The genus *Allium* – taxonomic problems and genetic resources. Proceedings of an international symposium held at Gatersleben, Germany, June 11–13, 1991. – Gatersleben: Institut für Pflanzen genetik und Kulturpflanzenforschung.

Tzanoudakis D. 2000: *Allium aegilicum* (*Alliaceae*), a new autumn-flowering species from the island of Antikithira (Greece). – Bot. Chron. (Patras) 13: 81–86.

Tzanoudakis D. & Kypriotakis Z. 1993: *Allium platakisii*, a new species of the Greek insular flora. – Fl. Mediterr. 3: 309–314.

Tzanoudakis D. & Kypriotakis Z. 2008: *Allium brussalisii* (*Alliaceae*), a new species from Greece. – Bot. J. Linn. Soc. 158: 140–146.

Tzanoudakis D. & Trigas P. 2015: *Allium occultum*, a new species of A. sect. *Codonoprasum* (*Amaryllidaceae*) from Skiros Island (W Aegean, Greece). – Phytotaxa 202: 135–142.

Tzanoudakis D. & Vosa C. G. 1988: The cytogeographical distribution pattern of *Allium* (*Alliaceae*) in the Greek peninsula and islands. – Pl. Syst. Evol. 159: 193–213.