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POLYCARPON DUNENSE (CARYOPHYLLACEAE), A NEW PSAMMOPHILOUS SPECIES FROM MINORCA (BALEARIC ISLANDS)

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SUMMARY: A new annual species, *Polycarpon dunense* P. Fraga & Rosselló (Caryophyllaceae), is described from the coastal sand dunes of northern Minorca (Balearic Islands). *Polycarpon dunense* is diploid (2n=16) and can be distinguished from the related taxa by a combination of characters including a small size and a prostrate habit, a glaucous leaf colour, leaf succulence, ovate leaf shape, narrower leaf size, smaller bract length, obtuse sepal apex, and smooth seed ornamentation. **Key words:** Endemism, Minorca, Balearic Islands, Western Mediterranean.

RESUMEN: Se describe una nueva especie anual, *Polycarpon dunense* P. Fraga & Rosselló (Caryophyllaceae), de las dunas costeras del norte de Menorca (Islas Baleares). *Polycarpon dunense* es diploide (2n=16) y puede ser discriminada de las otras especies relacionadas por una combinación de caracteres entre los que destacan un tamaño pequeño y hábito postrado, la coloración glauca de sus hojas así como su suculencia foliar, la forma oval de las hojas y su menor tamaño, la longitud menor de sus bràcteas, los ápices obtusos de sus sépalos y la ornamentación lisa de la testa seminal. **Palabras clave:** Endemismo, Menorca, Islas Baleares, Mediterráneo occidental.

INTRODUCTION

Polycarpon (Caryophyllaceae) as traditionally circumscribed is a genus of about 16 species distributed through the warm and temperate regions of both hemispheres (PEDERSEN, 1987). The genus has been traditionally placed in the tribe *Polycarpeae* of the subfamily *Paronychioideae* (BITTRICH, 1993), although recent phylogenetic work within the family suggests that tribe *Polycarpeae* is at least paraphyletic (SMISSEN & *al*., 2002). Recent phylogenetic work on *Polycarpon* using nuclear and chloroplast DNA sequences has shown that *Polycarpon* as currently recognised is polyphyletic, with South American species more closely related to *Haya obovata* (Socotra) and *Polycarpaea spicata* (paleotropical) than to the remaining species of *Polycarpon*, and the widespread tropical species *P. prostratum* was nested with Macaronesian species of *Polycarpaea* (KOOL & *al*., 2007).

The taxonomic classification of the genus in the Mediterranean area has been built on the basis of the life form. In this way two main groups are distinguished: annual plants are grouped in the *P. tetraphyllum* (L.) L. complex, while the peren-

nial ones included a closely related group of taxa in the *P. polycarpoides* (Biv.) Fiori complex (FIORI, 1923-1925; QUÉZEL & SANTA, 1962; PIGNATTI, 1983; BOLÒS & VIGO, 1990; AMICH & PEDROL, 1990). Moreover, concerns about the number and taxonomic delimitation of species within each group have been pointed out by several authors (e.g., CHATER & AKEROYD, 1993; JEANMONOD, 2004). Even some authors (KOOL & *al*., 2007) included all Mediterranean species, either perennial or annual, within a single polymorphic taxon (the *P. tetraphyllum* group).

During field work devoted to study the flora of the dune systems of Minorca several annual populations of *Polycarpon* were found. The plants were morphologically quite different from any taxa previously described within the *P. tetraphyllum* complex. In fact, some morphological characters shows more similarities with the perennial plants of the *P. polycarpoides* group, like the presence of a well differentiated taproot, fleshy leaves or obtuse sepals. The examination of herbaria specimens from the whole Mediterranean have revealed that these plants from dune environments belong to a new species so far restricted to Minorca. Accordingly, they are here described as *P. dunense* and the evidences for this are given below.

Polycarpon dunense P. Fraga & Rosselló, sp. nova (Fig. 1)

Diagnosis. A *Polycarpon polycarpoides* similis, sed annua, parvula, foliis ovalibus, minores et angustiores (1.5-5 x 1-3 mm), bracteis longioribus (1-1.5 mm), stamina numeri (3) et chromosomatum numerum (2n=16) differt.

Type: Minorca. In arenosis loco dicto Arenal de sa Cavalleria, ad 10 m, 31TEE 919348, ubi P. Fraga 31-III-1996 legit (Holotypus:VAL 202229; Isotype: herbarium P. Fraga).

Derivatio nominis: from its psammophilous habitat.

DESCRIPTION

Small annual 0,5-1 cm high; main stem simple or branched radially just above the epicotyl, thus each plant has typically a rounded outline; branches short, 0,5-3 cm long, prostrate, stems red; root system formed by a main slender taproot, 5-10 cm long, with numerous capillary secondary roots in the lower half; leaves opposite, fleshy, glabrous, silvery glaucous, the lower ones tinged red at the anthesis, basal leaves orbicular spatulate, caulinar leaves elliptic to ovate, blade 1,5-5,3 x 1-3,3 mm, the lower and middle ones petiolate, petiole 1-3 mm, upper ones sessile or subsessile, apex obtuse or subacute, margins entire; stipules up to 1,5 mm long, silvery white, papery, broadly triangulate, obtuse or subacute, with the margins denticulate fimbriate; inflorescence a much branched, congested cyme; inflorescence branches very short, usually less than 1 mm; pedicels up to 1,25 mm; bracts conspicuous, silvery white, resembling the stipules, but narrower and long acuminate; sepals with a rounded back, not keeled, margins hyaline, wide, apex cucullate, rounded, the outer narrowly ovate, 1,8-2,4 x 0,6-0,9 mm, the inner wider, 1,8-2,6 x 0,8-1,2 mmm; petals shorter than the sepals, membranous, hyaline, oblong, up to 1 mm long and 0,5-0,7 mm wide, apex obtuse and slightly dentate; stamens 3, about 1 mm long; anthers pale yellow, suborbicular, 0,2-0,4 mm diameter; ovary subglobose, about 0,8 mm diameter; style very short, 0,1-0,2 mm long, bifid above. Capsule pale yellow, 1,7-2,1 mm long, 1,4-1,7 mm wide, walls of valves incurved after dehiscence; seeds 0,4-0,6 mm long, 0,3-0,5 mm wide; testa whitish brown, smooth. 2n=16.

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COMPARATIVE MORPHOLOGY

The new species found in three dune systems of the north coast of Minorca show morphological features and ecological preferences that allow an easy discrimination from the known taxa of the genus in the Mediterranean region. The new species could be easily differentiated by a combination of characters including a small size and a prostrate habit, a glaucous leaf colour, leaf succulence, ovate leaf shape, narrower leaf size, smaller bract length, obtuse sepal apex, and smooth seed ornamentation. Morphological key features used to discriminate *P. dunense* from the taxa included within the *P. tetraphyllum* complex are reported in Table 1. Furthermore, *P. dunense* is diploid, in contrast with the higher ploidy levels usually reported within *P. tetraphyllum*.

In addition, the annual life cycle, the presence of conspicuous stipules, and the number of stamens (3) are the main characters to differentiate it from the perennial taxa included within the *P. polycarpoides* group.

HABITAT AND DISTRIBUTION

Currently, *Polycarpon dunense* is only known from three localities in the north coast of Minorca (Fig. 2). It grows exclusively in well preserved coastal sand dunes, at low altitudes between 5 and 50 m a.s.l. The species has a marked preference for growing in the north face of mobile sand dunes, located on Paleozoic substrates. The presence of both, strong, dry and cold winds in winter, and extended dry and hot summers, make this habitat particularly harsh to any plant.

Thus, usually few species are growing in these environments. Sometimes *P. dunense* forms monospecific stands, but more often it forms a particular association with other plants, mainly annuals showing a similar growth habit, like *Arenaria leptoclados* (Rchb.) Guss., *Cerastium semidecandrum* L., *Lobularia maritima* (L.) Desv., *Malcolmia ramosissima* (Desf.) Thell., *Rumex bucephalophorus* L., *Senecio vulgaris* L., *Silene sclerocarpa* Dufour *Silene sedoides* Poir., *Valantia muralis* L. Also, some Balearic endemics can rarely be found in this habitat (*Senecio rodriguezii* Willk., *P. colomense* Porta).

The particular environment shown by *P. dunense* has substantial differences with the other taxa of the genus present in Minorca. On the one hand, members of the *P. tetraphyllum* group (including var. *diphyllum* (Cav.) DC. and subsp. *alsinifolium*) that are commonly found in sand dunes, usually grow in established soils and with a significant presence of organic litter. On the other, *P. colomense* mainly grows in coastal rocky slopes throughout all the Eastern Balearic Islands, although it rarely grows in sympatry with *P. dunense*.

Despite its small size and annual life cycle, *P. dunense* can not be considered as an ephemeral therophyte. It start to germinates with the first abundant rains in October or November and its flowering period occurs from April to June. So it has a life span similar to any winter growing Mediterranean annual.

The particular habitat of *P. dunense* could be linked to some morphological features exhibited by the new species. These include the presence of a long taproot, fleshy leaves, and a dwarf growing habit. The plant also shows the ability to grow up through the sand when it becomes buried after a prolonged episode of strong winds. Thus, most plants when examined closely show the mesocotil several centimeters below the ground.

CONSERVATION STATUS

Despite extensive field work, *Polycarpon dunense* has been only detected in three dune systems from the north coast

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of Minorca. All the attempts to locate it in other similar habitats have been unsuccessful. The conservation status of this new species is not the same for each place.

The eastern and western populations are located in dune systems than have suffered important environment degradation caused by sand extraction to supply building activities on the island. Fortunately, this activity is currently banded, but the damage made to the system is quite important. The western population was, so far, the most affected by this activity. In fact, it is only formed by two small subpopulations located in opposite places of the dune system: one close to sea, just behind the beach, and the other inland, where some favorable habitats seem to have recovered after sand extraction activities have ceased. The degradation of the environment where is located the eastern population is not at risk thanks to an earlier stopping of sand extractions, about 20 years ago. Here, the new species forms stands composed by several thousands of individuals in the slopes of the dunes not affected by the industrial activity. The situation is much better in the central population and the plants grow in a completely unaltered dune system, forming dense and frequent stands in the slopes of bare sand in an area of several thousand square meters.

Due to the fragility of its habitats and its narrow distribution area, it is highly recommended some legal figure of protection to assure its conservation.

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	P. tetraphyllum			*P.colomense*	*P. dunense*
	subsp. *tetraphyllum*	subsp. *diphyllum*	subsp. *alsinifolium*		
Life form	Annual (rarely biannual)	Annual	Annual	Perennial	Annual
Leaf shape (mature plants)	Elliptic to ovate	Obovate	Lanceolate to elliptic	Lanceolate to ovate	Oval to ovate
Leaf size (mm)	4-15 x 8-12	3-5 x 8-12	5-12 x 1.5-5	5-12 x 3-4	1.5-5 x 1-3
Leaf thickness	Not fleshy	Not fleshy	Slightly fleshy	Fleshy	Fleshy
Bract length (mm)	1.5–2	2–3	2-2.5	0.5-0.75	1-1.5
Sepal apex	Cuspidate, carinate	Acute, carinate	Subacute – obtuse, slightly carinate	Subacute-obtuse	Obtuse, not carinate
Petal apex	Truncate or emarginate	Truncate or emarginate	Truncate or emarginate	Obtuse	Obtuse-dentate
Stamen number	3 (4)	3 (4)	(4) 5	5	3
Seed surface	Verrucose	Verrucose	Smooth	Verrucose	Smooth
Chromosome number	2n=32, 48, 64	2n=64	2n=48	2n=42	2n=16

Table 1. Comparative morphology between *Polycarpon dunense* and related taxa from the Western Mediterranean

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Fig 1. Flowering specimen of *P. dunense* at the type locality.

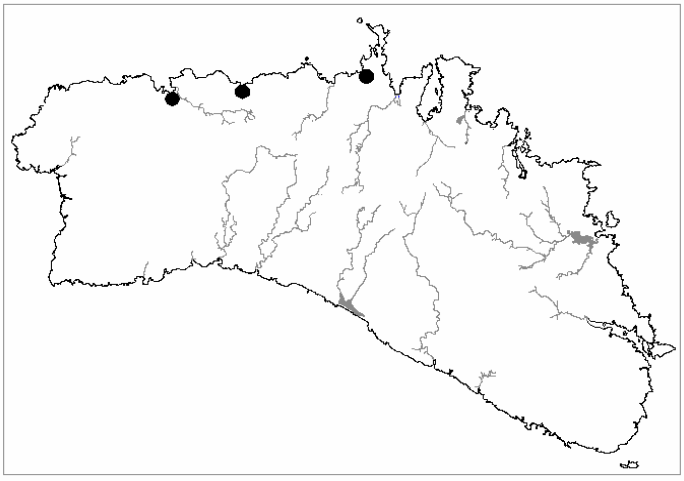

Fig. 2. Distribution map of *P. dunense* based on field records and herbarium specimens.

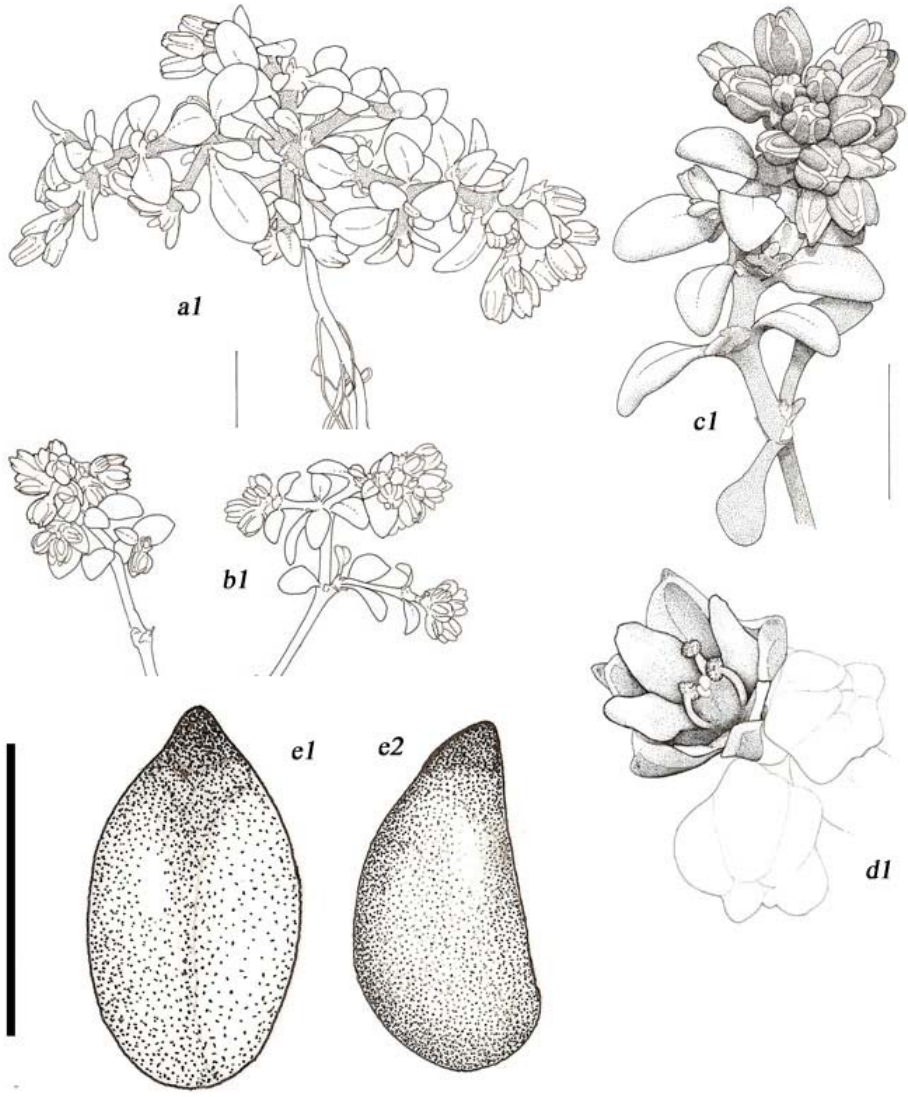

Fig. 3: *Polycarpon dunense*. Habit (a1, b1). Inflorescence (c1). Flower (d1). Seeds (e1, e2).

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