

# *Sarcocornia hispanica* (Chenopodiaceae), a new species from the Iberian Peninsula

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**Abstract:** Fuente, V. de la, Rufo Nieto, L. & Sánchez-Mata, D. *Sarcocornia hispanica* (Chenopodiaceae), a new species from the Iberian Peninsula. *Lazaroa* 32: 9-13 (2011).

A new hexaploid species of *Sarcocornia* A.J. Scott, *S. hispanica*, is described from south east territories of the Iberian Peninsula as a new species. The micro-, macromorphological and cytological features of this taxon are given.

**Keywords:** *Chenopodiaceae*, *Sarcocornia*, *Sarcocornia hispanica*.

**Resumen:** Fuente, V. de la, Rufo Nieto, L. & Sánchez-Mata, D. *Sarcocornia hispanica* (Chenopodiaceae), una especie nueva de la Península Ibérica. *Lazaroa* 32: 9-13 (2011).

Se describe una nueva especie de *Sarcocornia* A.J. Scott: *S. hispanica*, del sureste de la Península Ibérica. Se aportan los correspondientes caracteres micro-, macromorfológicos y citológicos del nuevo taxon descrito.

**Palabras clave:** *Chenopodiaceae*, *Sarcocornia*, *Sarcocornia hispanica*.

## INTRODUCTION

Three species of *Sarcocornia* A.J. Scott have been recognized in the Iberian Peninsula: *S. perennis* (Mill.) A.J. Scott, *S. fruticosa* (L.) A.J. Scott and *S. alpini* (Lag.) Rivas-Martínez. The taxonomy of the genus *Sarcocornia* has been widely discussed by many authors due to the inter-specific hybridization (LAGASCA, 1817; WILLKOMM, 1862; BALL, 1964; SCOTT, 1977; CASTROVIEJO & COELLO, 1980; PASTOR & VALDÉS, 1986; CASTROVIEJO 1990; CASTROVIEJO & LAGO, 1992; BALL, 2003; SHEPHERD & *al.*, 2005; KADEREIT & *al.*, 2006, ALONSO & *al.*, 2008, etc.).

As a result of a exhaustive revision of the *Sarcocornia* communities of the Iberian Peninsula we have the opportunity to collect and study numerous wild populations from the east of the Iberian Peninsula. In these territories the dominant species in the saline depressions close to the Mediterranean coast is *S. fruticosa*. However in our

study we have observed specimens that do not correspond to the description of this species. The macro- and micromorphology, ecology and cytology data from these specimens convinced us that it should be ascribed to a new species.

## MATERIALS AND METHODS

### PLANT MATERIAL

Complete fresh specimens from different coastal and inland *Sarcocornia* species of the Iberian Peninsula were collected directly from the field in different stages: summer-autumn (flowers) and autumn-winter (fruit). Plant material was preserved at - 20°C for subsequent analysis. Voucher specimens of analyzed material are preserved in MAF Herbarium (Faculty of Pharmacy, Complutense University, Madrid, Spain) and in our personal collections (V. de la Fuente, Autonomous University, Madrid, Spain).

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Besides fresh plant material, the morphological study of seeds and fruits was completed with voucher specimens of different herbariums: MA Herbarium (Real Jardín Botánico, CSIC, Madrid, Spain); MAF Herbarium, and UPS Herbarium (Uppsala University, Sweden).

A complete list of collected plant material and voucher specimens employed for this study is presented in the attached appendix.

#### MORFOLOGICAL AND MICROMORFOLOGICAL CHARACTERS

##### *Scanning electronic microscopy analysis (SEM)*

Cross-sections of flower, fruits and seeds were cut with a sharp blade. Dry samples were fixed *in situ* with formyl acetic alcohol (FAA). After washing with a 0.1M phosphate buffer (pH 7.4), they were dehydrated through a graded ethanol series. Dry samples were mounted flat on the surfaces of conductive graphite stubs and sputtered and gold-coated in a Bio-Rad SC 502 apparatus for electrical conductivity and to prevent charging under the electron beam. Samples were examined with a Hitachi S-3000N (Japan) SEM using an acceleration voltage of 20 kV and a working distance of 15 mm. The temperature of the sample stage during analysis was room temperature.

#### CHROMOSOME COUNTS

Mitotic chromosome counts were made from root meristems. Young radicles from root tips taken from germinated seeds were used. Samples were pretreated with 0.002 M 8-hydroxyquinoline at 4° C for 24 h. The material was fixed with Carnoy at 4° C overnight. The radicles were then hydrolysed with 5 N HCl for 5-15 min at room temperature stained with 2% acetic orcein and squashed. At least ten counts were made from each population (Appendix 1).

#### RESULTS

***Sarcocornia hispanica*** Fuente, Rufo & Sánchez-Mata, **sp. nova**

*Holotypus*: Spain, Alicante: Villena, Las Virtudes, 29.VIII.2008, 30SXH8176, V. de la Fuente & al., MAF 169314.

*Diagnosis*: Frutex erectus, altus usque ad 100-150 cm., multicaulis; caules succulenti, articulati, erecti vel erecti-ascendentes. Rami virides; ramificatio ordinate decussata, saepe verticillata. Folia opposita, connata-amplexicaulia, squamiformia, margine hyalino, scarioso-membranaceo, apicibus subacutis vel rotundatis. Inflorescentiae laterales et terminales, spicatae, segmentis longis; cyma triflora cum floribus duorum staminum et duorum stigmatum.

*Affinis Sarcocorniae fruticosae* (L.) A.J. Scott, sed a qua nuculae pericarpio membranaceo semini connato differt; semina rotundata; testa seminum dense papillata et in margine vestita pilis brevibus (35-52 mm. longis).

*Description*: Perennial woody shrub, 100-150 cm tall. Erect. Woody erect and not rooting stems and main branches. Secondary branches erect and ascending. Regular decussate ramification, occasionally whorled. Opposite amplexicaule scale-like leaves, fused to form a collar-like segment, with a membranaceous / scariosus hyaline margin 0.3 mm wide with a subacute to rounded apex, not or slightly keeled.

Inflorescence 2-3 mm wide, spicate, terminal and lateral, segmented; each fertile segment composed of two 3-flowered cymes, decussate, immersed in the pair of opposite scale-like bracts, arising from the node above. Cymes formed of three sessile flowers in a row, free from each other; central flower a bit bigger than the lateral flowers, far from the upper segment. Fleshy perianth formed of four fused tepals, becoming spongy in fruit. Stamens 2; superior ovary with two stigmas.

Fruit an achene. Membranaceous pericarp partially fused to the seed. Round vertical brownish seeds 0.9-1.1 mm long and 0.7-0.8 mm wide. Surface exotesta verrucate covered with papillae (35-52 μm long and 29-40 μm wide) on the radical edge of the seed (Figure 1). Conduplicate embryo.

*Cytology*: 2n = 54. Our counts confirm the hexaploid level previously established by Castroviejo and Coello (1980).

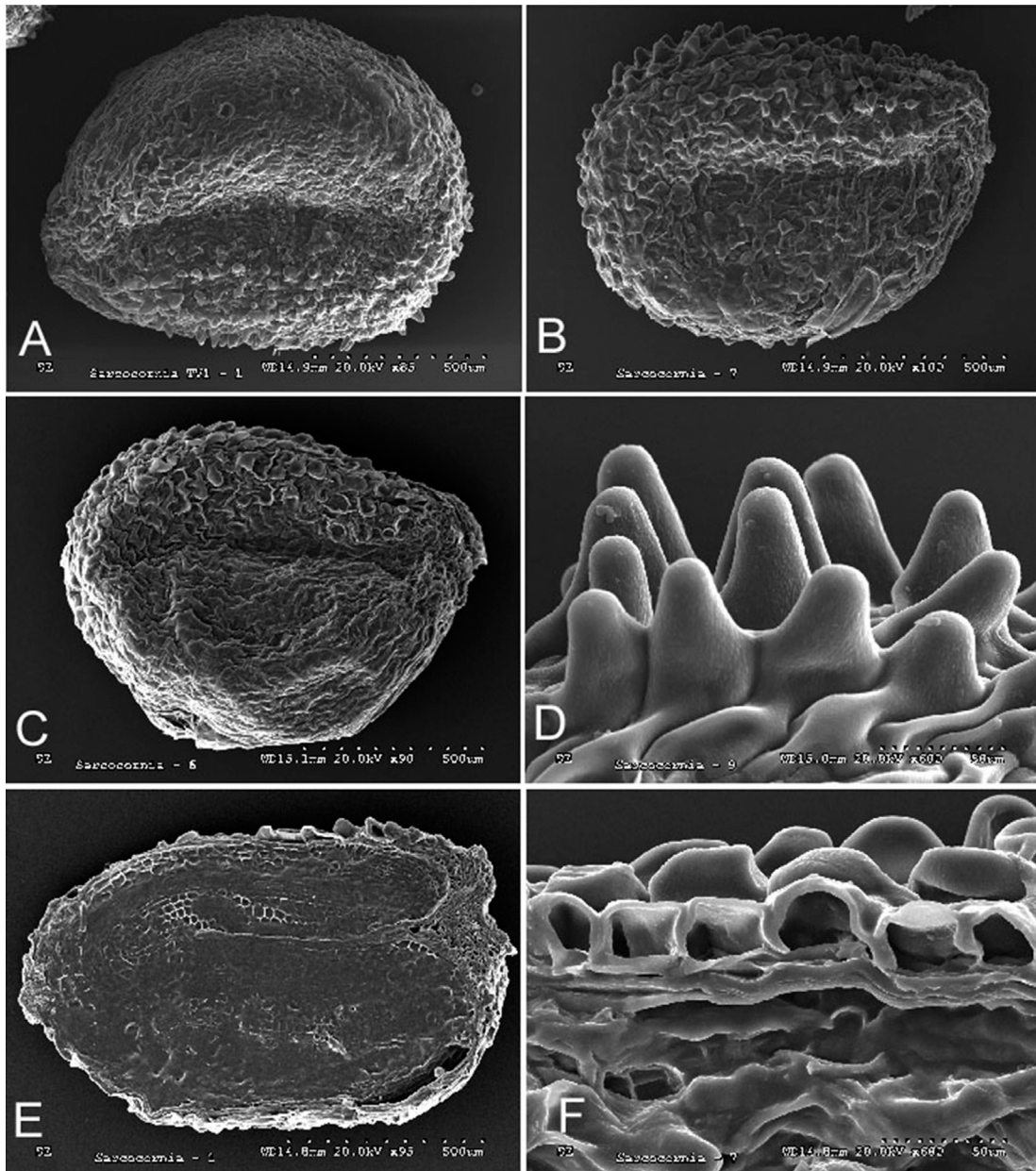


Figura 1.– Representative SEM micrographs of seeds of *Sarcocornia hispanica*. General habit of the seed from MAF 169310 (A), MAF 169357 (B), and MAF 169314, *holotypus* (C); D. Detail of testa indument on an edge of the seed; E. Transversal section of *S. hispanica* seed showing cotyledons and epidermal cells of the exotesta; F. Detail of papillae of the exotesta.

*Distribution:* Western Mediterranean biogeographical territories. We know *Sarcocornia hispanica*, only from the Iberian Peninsula, from the Manchego-Murciano biogeographical sector (Manchego sector, Castellana subprovince, Mediterránea Ibérica Central province), and Mur-

ciano-Almeriense biogeographical province; our taxon reaches also some inland localities of the eastern Bética biogeographical province (Accitano-Baztetano sector, Hoyano Accitano-Baztetano subsector) (RIVAS-MARTÍNEZ & *al.*, 2002; RIVAS-MARTÍNEZ & *col.*, 2011).

*Ecology and Phytosociology:* *Sarcocornia hispanica* occurs in saline depressions where usually it is not reached by sea water. It could also be found far away from the coast in endorreic lakes derived from Tertiary materials, or even in canals of salt works. It usually grows on saline sandy to clayey gypsiferous soils where it can be accompanied mainly by *Arthrocnemum macrostachyum* [*Arthrocnemion macrostachyi* (Rivas-Martínez & Costa 1984) Rivas-Martínez & Costa in Rivas-Martínez & col. 2011, *Arthrocnemion macrostachyi* Rivas-Martínez & Costa 1984 nom. mut., *Sarcocornietea fruticosae* Br.-Bl. & Tüxen ex A. & O. Bolòs 1950 nom. mut.] (RIVAS MARTÍNEZ & col., 2011). We know the new proposed taxon from Xeric oceanic and Pluviseasonal oceanic Mediterranean bioclimates, meso- and thermomediterranean thermotypes, dry and semiarid ombrotypes, and euoceanic territories (GIMÉNEZ LUQUE & GÓMEZ-MERCADO, 2002; SALAZAR & al., 2002; ALONSO & DE LA TORRE, 2002; RIVAS-MARTÍNEZ & col., 2007).

## DISCUSSION

We have found as main characters to differentiate *Sarcocornia hispanica* from the rest of *Sar-*

*cocornia* species of the Iberian Peninsula: life form, shape of the leaf apex, pericarp and seed shape and testa ornamentation. The perennial habit (plants up to 100 m high), the pericarp fused to the seed and the verrucate surface exotesta of this species distance it from the others European species of this genus.

The relation between pericarp and seed has been found to be variable between some species (SHEPERD & al., 2005). Most of them presents a pericarp adhered to the seed. *S. hispanica* species is an exception, presenting a pericarp partially fused to the seed. In both cases the pericarp only tears at the radical edge of the seed at maturity.

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## APPENDIX 1

### STUDIED SPECIMENS

*Sarcocornia hispanica* Fuente, Rufo and Sánchez-Mata, *spec. nova*. SPAIN: **Alicante:** Villena, Las Virtudes, 29.08.2008, 30SXH8176, V. de la Fuente (MAF 169314\*, *holotypus*). **Alicante:** San Felipe Neri, El Hondo, 29.08.2008, 30SXH9647, V. de la Fuente (MAF 169357\*, 169475, 169476, 169477). **Alicante:** Santa Pola, Playa Lisa, 29.08.2008, 30SYH1230, V. de la Fuente (MAF 169311, 169312). **Alicante:** Torrevieja, Laguna Grande, 22.09.2009, 30SYH0308, V. de la Fuente, L. Rufo & N. Rodríguez (MAF 169310). **Granada:** De Corte(s) a (Baños de) Benzalema. Lag. Pl. Barr. P 49. (1817), leg. S.R. Clemente (MA 29392, 29393). **Granada:** El Margen del Culler, Baza, alt. 850, 9.10.1981, J.M. Losa Quintana (MA 346484).

\* Populations with chromosome counts.

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