Diversity and conservation in wild and cultivated *Capparis* in Sicily

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Abstract

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The taxonomy, distribution and ecology of the polymorphic *Capparis spinosa* L. in Sicily are discussed. *C. spinosa* subsp. *rupestris* (Sibth. & Sm.) Nyman, a leathery-leaved, pendulous-branched shrub is widespread on carbonate, volcanic and gypsaceous outcrops. Subsp. *spinosa*, a thorny chamaephyte or hemicryptophyte with creeping branches, is mainly distributed in south-central parts of Sicily, on clay and natric soils under xerophilous conditions. Attention is drawn to a remarkable environment-induced variation within the latter subspecies. The heterogeneity of the cultivated forms of subsp. *rupestris* on the island of Pantelleria (Strait of Sicily) appears to be linked to crossing and introgression with wild populations.

The use of flower buds of Mediterranean species of *Capparis* as a relish is widespread since ancient times. Several Greek and Latin Authors, as Hippocrates, Aristotle, Theophrastus, Pliny the Elder, wrote about the alimentary and therapeutic properties of these plants. The traditional harvest of flower buds from wild plants is still widespread in several Mediterranean countries. The specialized cultivation of capers in Italy is quite recent, reaching economic significance only during the last few decades. The national production is at present concentrated in two volcanic islets in the proximity of Sicily, Pantelleria (Strait of Sicily) and Salina (Tyrrhenian Sea), on a total surface of ca. 950 ha. (Barbera 1991).

The genus *Capparis* includes about 250 species distributed in the tropical and subtropical regions of the Old and New World. The polymorphic *C. spinosa* L. complex shows a large palaeotropical and subtropical distribution, with several entities recorded from southern Europe, North and East Africa, Madagascar, South and Central Asia, Australia and Oceania. In the Mediterranean Region its taxonomic treatment is still critical, due to the variability of vegetative characters that are usually regarded as diagnostic (e.g. texture, leaf size and shape, morphology of the stipules, etc.). Within this 'chaotic group' Zohary (1960) recognized in the Mediterranean and Near Eastern

countries three extremely variable and intercrossing species, *C. spinosa, C. ovata* Desf. and *C. leucophylla* DC. A broader species concept was adopted by Jacobs (1965), who included in the intraspecific variation of *C. spinosa* all the taxa known from the different areas of the Old World. More recently Higton & Akeroyd (1991) referred all the European populations to *C. spinosa*, here in Sicily represented by subsp. *spinosa,* split into var. *spinosa* and var. *canescens* Cosson, and subsp. *rupestris* (Sibth. & Sm.) Nyman.

As regards the cultivated forms in Italy, these often show marked heterogeneity and more or less close affinities with the wild populations. This is particularly evident in the island of Pantelleria, where propagation by seeds is used. Furthermore less productive forms are increasingly neglected by the farmers. While the wild populations are usually preserved from the effects of anthropogenic disturbance, conservation programmes should be devised for these disappearing cultivated races.

Wild forms

Both subspecies recognized in the European flora by Higton & Akeroyd (1991) are present in the island. *C. spinosa* subsp. *spinosa* var. *canescens* is widespread on clay soils in markedly xerophilous areas of Southern and Central Sicily. *C. spinosa* subsp. *rupestris* is mainly present along the coastal limestone and volcanic cliffs.

Capparis spinosa L. subsp. ***spinosa*** var. ***canescens*** Cosson, Not. Pl. Crit. 28 (1849). *C. spinosa* subsp. *canescens* (Cosson) A. & O. Bolòs, Misc. Fontsere 88 (1961); *C. ovata* Desf. var. *canescens* (Cosson) Heywood, Feddes Repert. 69: 56 (1964). Type: "Spain. Buenavista prope Xeres, Bourgeau 1849, Fl. Esp. 43" (P, holotypus).

C. sicula Veill. in Duh., Traite Arbr. Arbust. 1:159 (1801).
C. herbacea Willd., Enum. Pl. Horti Berol. 560 (1809).
C. fontanesii Presl, Fl. Sic. 1:111 (1826).
C. ovata Desf. var. *sicula* (Veill.) Zohary, Bull. Res. Counc. Israel 8D: 55 (1960).

Chamaephyte or hemicryptophyte with creeping branches up to 3 m long; young twigs white-appressed pubescent. Leaves elliptical-oblong, chartaceous, 1.3-2.9 × (2-) 3-4.2 cm, sparsely pubescent, with apical mucro; petiole sulcate, 3-7 mm long; stipules thorny, recurved, 2-5 mm long. Flowers more or less zygomorphic, solitary, axillary; posterior sepal 1.5-2.3 cm long, saccate, the others 1.3-2.2 cm long, concave; upper pair of petals connate, the lower pair free, obovate, 1.8-2.7 cm long; stamens many, with filaments 2.5-3.5 cm long; gynophore 3-4 (-4.4) cm long; ovary ovate-ellipsoid 3-4 mm long. Fruit spheroid, 3-4.2 cm long, usually splitting along 3-4 ribs. Fl.: May-Sept (Fig. 1).

Distribution in Sicily — South-central areas, eastwards to Catania District, with disjunct populations in the northern coast between Torremuzza and S. Stefano di Camastra.

Ecology — Roadsides, wastelands, foothills, becoming a weed of cultivated ground; on regosols, brown soils and lithosols along the 'Gessoso-Solfifera' formation and other Miocene sedimentary rocks such as clay and marl; 0-900 m.

Fig. 1. *Capparis spinosa* subsp. *spinosa* var. *canescens* Cosson: flowering and fruiting branches (x 0.65); seeds (× 8); stipules (× 5).

The geographical range of this taxon, extending from the Mediterranean Basin eastwards to Caucasus, Crimea, Armenia and Azerbaijan, is the most northern within the mainly tropical and subtropical *C. spinosa* complex. Also in Asia the plant is usually linked to clay and natric soils. In subsp. *spinosa* var. *canescens* the reduction of epigeal organs and shortening of vegetative period is remarkable. The prostrate habit, with branches desiccating during the winter and chartaceous-pubescent leaves, can be regarded as adaptions to continental xeric conditions. It should be emphasized that tropical entities within this complex (e.g. *C. cartilaginea* Decne.) are usually evergreen leathery-leaved shrubs or small trees.

In Sicily a form characterized by larger, ovate-orbicular leaves, corresponding to var. *spinosa* is also present. This form has been sporadically observed in proximity of populations of var. *canescens*, but in particular edaphic conditions (clay soils mixed with limestone or gypsum, old walls). The co-existence of the two forms (sub *C. sicula* Veill. and *C. spinosa*) in xeric areas of central Sicily was already underlined by Lojacono-Pojero (1888). The remarkable variation of vegetative organs in Asiatic populations of subsp. *spinosa* var. *canescens* (sub *C. herbacea* Willd.), was referred by Bobrow (1985) to edaphic conditions and to the age of the individuals.

Investigations on developmental phases of seedlings have been undertaken, confirming marked environmentally-induced variation within subsp. *spinosa*. Furthermore no appreciable differences were observed in the vegetative features of young plants, obtained from seeds of both var. *spinosa* and var. *canescens*, cultivated under uniform conditions. These preliminary observations suggest the presence in Sicily of two edaphic variants, usually treated as separate varieties, within subsp. *spinosa*.

Capparis spinosa L. subsp. ***rupestris*** (Sibth. & Sm.) Nyman, Consp. Fl. Eur. 68 (1878). *C. spinosa* var. *rupestris* (Sibth. & Sm.) Viv., Fl. Lib. Spec. 26 (1824). *Basionym*: *C. rupestris* Sibth. & Sm., Fl. Graec. Prodr. 1: 335 (1809). Type: not designated.

C. inermis Turra, Fl. Ital. Prodr. 65 (1780).
C. orientalis Duh., Traité Arbr. Arbust. 1:142 (1801).
C. peduncularis Presl, Del. Prag. 20 (1822).
C. spinosa var. *inermis* (Turra) Zohary, Bull. Res. Counc. Israel 8D: 51 (1960).

Shrub with spreading-pendulous branches up to 3-4 m long; young twigs glabrescent. Leaves ovate to orbicular, leathery, (1.7-) 2-4.5 × 2.5-6 cm, apically rounded, blunt or retuse, basally subcordate or rounded; petiole 0.4-1.7 cm long; stipules 0.8-2.4 mm long, often caducous, setaceous, rarely thorny. Flowers slightly zygomorphic, axillary, solitary; posterior sepal saccate, 1.8-2.7 cm long, the others 1.8-2 cm long, boat-shaped; upper pair of petals connate, lower pair free, obovate, 1,8-2.5 cm long; stamens many with filaments 2.5-4 cm long; gynophore 3.5-4.5 cm long; ovary narrowly ellipsoid, 3-5 mm long. Fruit oblong-ellipsoid, 3.2-5 cm long, apically acute or apiculate, usually splitting along one rib. Fl.: Apr-Sept (Fig. 2).

Distribution in Sicily — Coastal belt and surrounding islands (Pantelleria, Ustica, Aeolian, Pelagian and Egadi Islands), scattered in the inner areas.

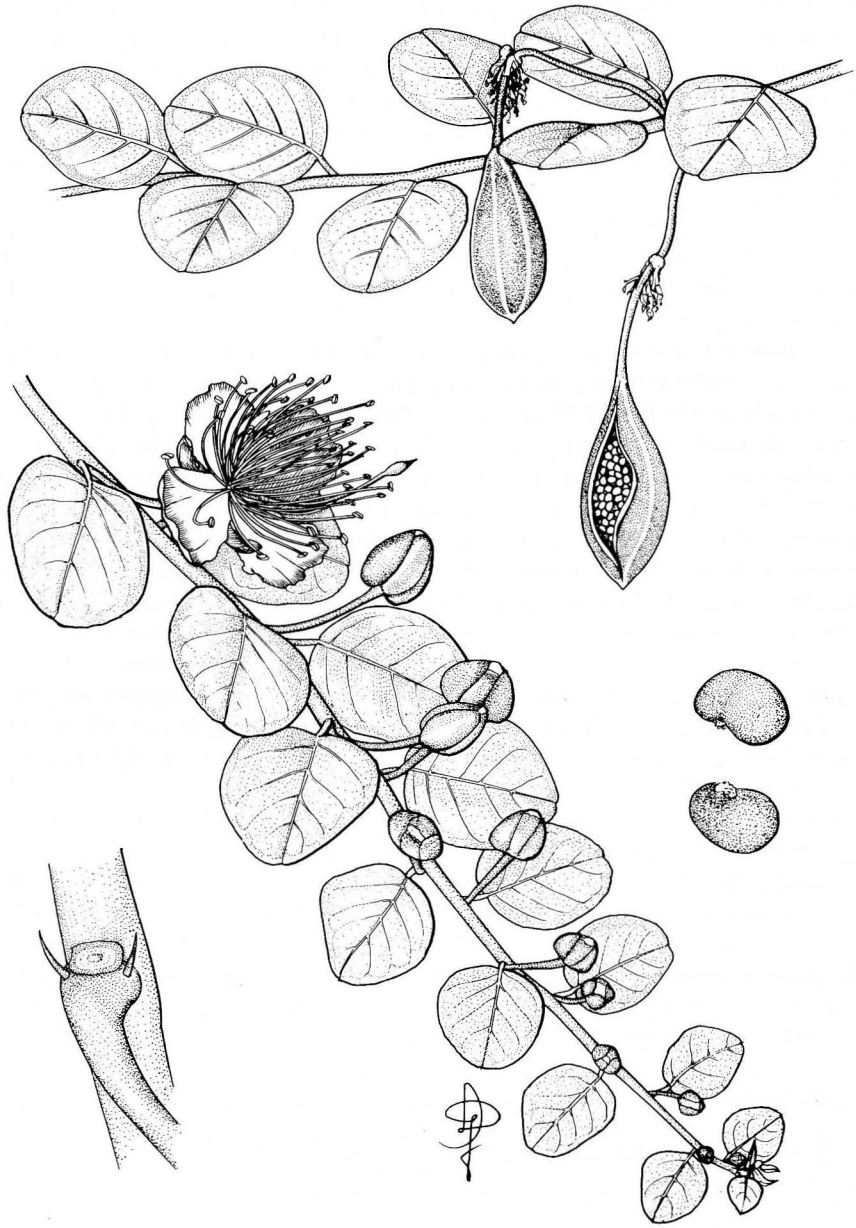

Fig. 2. *Capparis spinosa* subsp. *rupestris* (Sibth. & Sm.) Nyman: flowering and fruiting branches (× 0.65); seeds (× 8); stipules (× 5).

Ecology — Rocky outcrops and slopes, cliffs, walls; on compact mesozoic limestone, Eocene and Oligocene limestone, marl, gypsum, lava and volcanic tuff; 0-950 m.

Subsp. *rupestris* is widespread in the rocky coastal areas of the Mediterranean Region. The limestone cliffs probably represent the primary habitat of *C. spinosa* s.l. in the Mediterranean. The vegetative characters of this subspecies, showing marked relationships with the tropical taxa of the same complex, are more stable than in subsp. *spinosa*. As regards the habit, from a swollen and verrucose base are produced several pendulous branches to 3-4 m long, usually perennial and bearing vegetative buds in the winter. The leaves are usually deciduous, but in some cases individuals with evergreen branches have been observed.

Cultivated forms

Cultivation of capers occurs today in the islands of Pantelleria and Salina, under particular climatic conditions, with a prolonged xerothermic period and high exposure to wind. Here the production of flower buds, extending from April to September, reaches its maximum during the hottest mounths. Sparse historical data on the cultivation of capers in these islands are available: Calcara (1853) observed in Pantelleria the collection of flower buds only from wild plants, while Lojacono-Pojero (1888) wrote about widespread cultivations of this plant in the Aeolian Islands. The recent selection of vigorous and productive plants from wild populations gave origin to cultivated 'biotypes' (Barbera 1991) that are often markedly heterogeneous. Subsp. *rupestris* is widespread in cultivation in Pantelleria, where propagation by seeds is carried out by farmers. Due to their neighbouring habitats and entomophilous pollination, gene flow between cultivated plants and wild populations is high. The cultivated forms from Salina are more homogeneous, since propagation by cuttings is widespread. Also these are to be referred to subsp. *rupestris*, although showing diverging vegetative characters from wild populations, such as more or less marked presence of spiny stipules.

Barbera & al. (1991) examined the main biometric characteristics of the six 'biotypes' or races cultivated in Pantelleria and Salina. In the first island "Nocellara", characterized by orbicular leaves, absence of thorns and almost spheroidal capers, is the most widespread and productive. Less common are "Ciavulara", "Testa di Lucertola" and "Spinoso di Pantelleria", the last one actually becoming very rare. In Salina "Nocella" is highly appreciated because of high productivity and rounded capers; spines are usually present, particularly on the older branches, but are less developed than in "Spinoso di Salina", which produces pyramidal capers.

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