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A taxonomic revision of the *Capparis spinosa* group (Capparaceae) from the Mediterranean to Central Asia

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Abstract

A revision of the *Capparis spinosa* group has been carried out in southern Europe, northern Africa, western and central Asia, in order to provide a uniform taxonomic treatment of its representatives. The xerotropical origin of this group, showing disjunct distribution in several holarctic and paleotropical regions, is underlined and the different species concepts historically adopted are discussed. In the present treatment a single species is recognized, *C. spinosa*, represented in the study area by two subspecies. *C. spinosa* subsp. *spinosa* shows derived characters, high polymorphism and a wide distribution range from the Mediterranean eastwards to China and Nepal. *C. spinosa* subsp. *rupestris*, less variable and showing phenotypic characters closer to the tropical stock of the group, is recorded in the Mediterranean Region and the Sahara. On the basis of herbarium and field investigations, the variability and distribution of the two subspecies are examined. Within each subspecies some varieties are recognized, for which morphological, chorological and autecological data are presented. Four new combinations (*C. spinosa* subsp. *spinosa* var. *herbacea*, *C. spinosa* subsp. *spinosa* var. *atlantica*, *C. spinosa* subsp. *rupestris* var. *ovata*, *C. spinosa* subsp. *rupestris* var. *myrtifolia*) are proposed.

Key words: *Capparis* sect. *Capparis*, distribution, ecology, intraspecific variability, species concept

Introduction

The *Capparis spinosa* Linnaeus (1753: 503) group, belonging to *Capparis* Linnaeus (1753: 503) sect. *Capparis*, includes several entities distributed in southern Europe, northern and eastern Africa, Madagascar, western, central and south-eastern Asia, Australia and Oceania (Jacobs 1965). From a phylogenetic point of view it is characterized by plesiomorphic features within the whole genus, such as simple hairs and solitary flowers in the leaf axils (Fici 2001). In the Middle East, Zohary (1973) regarded the genus *Capparis* as a relic of a Tertiary xero-tropical flora, which gave origin to extratropical derivatives within the *C. spinosa* group. Discussing the origin of the Chinese desert flora, Liu (1995) considered *C. spinosa* and other species extending to the Mediterranean Region as phytogeographic elements showing Tethydean connections between these areas. An ancient origin of *Capparis* sect. *Capparis* and its basic position within the genus are supported by its primitive features, with special reference to indumentum, flower position and ovary. Furthermore, the presence of several variants on different gondwanian landmasses represents a complex biogeographic study case (Fici 2004).

Commercial capers are flower buds pickled in salt or vinegar and used as a condiment, but also unripe fruits and young twigs are widely pickled (Rivera *et al.* 2003a). Capers are collected from wild plants in several Mediterranean and Asiatic countries, while specialized cultivation of the plant is recorded from Spain, France and Italy, where several local cultivars and ethnovarieties are known (Inocencio *et al.* 2006). *C. spinosa* s. l. has been used by man for alimentary and therapeutic purposes since ancient times, as reported by several Greek and Latin Authors, e. g. Hippocrates, Aristotle, Theophrastus, Pliny the Elder, etc. (Fici & Gianguzzi 1997). This use has been traced back to Prehistory in Syria (9th–8th mill. B. C., Tell Mureybit I–IV) and Greece (9.000–7.400 B. C., Franchti Cave), as evidenced by the presence of caper seeds and charcoals in archaeological sites (Rivera *et al.* 2002). Recently, *C. spinosa* seeds, together with vegetative and reproductive parts of *Cannabis sativa*, were discovered in the Yanghai Tombs of Turpan District in Xingjiang (c. 2800 B. P.), where it is hypothesized that the plant was used for medicinal purposes (Jiang *et al.* 2007).

The representatives of the *C. spinosa* group are often characterized by marked polymorphism, with presence of intermediate forms and parallel variation (Heywood 1964 a). Due to this complex variation pattern, the group has

been defined by Zohary (1960) as “chaotic” in the Mediterranean and Middle East. Furthermore, herbarium material is rarely adequate for a complete study of all characters (Hedge & Lamond 1970) and a striking variability in the size and shape of flowers is frequently observed in the same individual (Fici 2001). The main diagnostic characters are the morphology and size of leaf and stipules, which often show extensive plasticity also at the population level (Fici 2004). So far, data on the genetic differentiation of the group are limited to a few countries (Inocencio *et al.* 2005, Moubasher *et al.* 2011, Bhoyar *et al.* 2012, Özbek & Kara 2013). The high variability can be explained by different factors, i.e. phenotypical plasticity, hybridization processes, selection of cultivated forms and eco–geographical differentiation.

The taxonomic treatment of the *C. spinosa* group is still critical in the Mediterranean Region and the Middle East, where several taxa at different rank have been described (Zohary 1960, Maire 1965, Inocencio *et al.* 2006, Danin 2010). Consequently, the narrower or wider species concept adopted in regional floristic works gave origin to discordant treatments (Muschler 1912, Ozenda 1958, Coode 1965, Nègre 1961, Quezel & Santa 1962, Heywood 1964 a, Zohary 1966, Bobrov 1970, Hedge & Lamond 1970, Jafri 1973, Blakelock & Townsend 1980, Pignatti 1982, Bolòs & Vigo 1984, Greuter *et al.* 1984, Higton & Akeroyd 1993, Marcos Samaniego & Paiva 1993, Boulos 1995, Boulos 1999, Nyberg 1996, Fennane & Tattou 1998, Tan 2002, Jury & Rutherford 2002, Giardina *et al.* 2007, Le Floc’h *et al.* 2010, Valdés 2013). Candolle (1824) firstly provided a taxonomic treatment of the whole genus *Capparis*, including *C. spinosa* and several other species from the Old World in sect. *Eucapparis* Candolle (1824: 245) series *Pedicellares* Candolle (1824: 245). Differently Boissier (1867) recognized the single *C. spinosa*, split into six varieties, in a wide area from eastern Mediterranean to India. More recently, Zohary (1960), in his revision of the genus *Capparis* in the Mediterranean and Middle East, adopted a narrower species concept recognizing in the *C. spinosa* group three variable, frequently overlapping species, subdivided in several varieties. St. John (1965) provided a complete revision of the group including the eurasiatic and paleotropical representatives, recognizing six geographically differentiated species. A wide species concept was adopted in the same period by Jacobs (1965) who considered the group in its whole distribution range to be constituted by only “one species, polymorphic and variable enough to embrace all the related species that have been described”. The same author split *C. spinosa* into five geographically differentiated varieties. Other Authors referred to the single *C. spinosa*, subdivided in subspecies, the populations from northern Africa (Maire 1965), southern Europe (Higton & Akeroyd 1991) and Australia (Fici 2003). Lastly a very narrow species concept was adopted by Inocencio *et al.* (2006), who recognized ten species and several taxa at subspecific rank in a wide area from the Mediterranean to central Asia. Based on the above considerations, the study of such a complex group can only be carried out examining its variation over a wide geographical range and evaluating its evolutionary trends from an ancient xero–tropical stock. The present paper is aimed at providing a uniform taxonomic treatment of the group in the Mediterranean, Irano–Turanian and Saharo–Sindian Regions. A subsequent contribution will deal with the paleotropical representatives of the same group. For each taxon here recognized morphological, chorological and ecological data, as well as keys, are given. The research was carried out through the study of collections in various European and Asiatic Herbaria (BM, B, E, FI, K, MA, P, PAL, PE, RNG, RO, TI). Herbarium investigations were coupled with field researches aimed at gaining further information on the growth forms, autecology and phenology of the different variants.

Taxonomic Treatment

Capparis spinosa Linnaeus (1753: 503).

Lectotype (designated by Burt & Lewis 1949): “Habitat in Europae australis arenosis, ruderatis” Herb. Clifford: 203, *Capparis* I (BM).

Prostrate, ascending or pendulous shrubs, with branches unramified to multiramified, up to 4 m long; young twigs glabrous, pubescent or white–tomentose, with simple hairs. Stipules thorny or setaceous, straight or recurved, up to 6 mm long, yellowish or orange, in some cases wanting or caducous. Leaves alternate with blade orbicular, ovate, obovate, lanceolate or elliptic, glabrous or pubescent, (0.5–) 0.8–6 (–8) × (0.4–) 0.5–4.5 (–7) cm, chartaceous to coriaceous or succulent, rounded, cordate, subcordate, truncate, obtuse, attenuate or cuneate at base, rounded, acute, obtuse, acuminate, truncate or retuse at apex, more or less distinctly mucronate; petiole entire or sulcate, 0–2 cm, glabrous or pubescent. Flowers solitary, axillary in the upper part of twigs, more or less zygomorphic, mostly noctiflorous; pedicels (0.8–) 2.5–8 cm long, glabrous to pubescent. Calix with 4 sepals, oblong or ovate, glabrous or pubescent outside, in bud all free, the posterior one slightly to strongly saccate, (0.8–) 1.2–2.5 cm long, other sepals (0.7–) 1.2–2.2 cm long. Petals 4, white or white–pinkish, upper pair connate, lower pair free, obovate, oblong or rounded–ovate, (0.8–)

1.5–3.5 (–4) cm long. Stamens numerous, up to c. 190, with filaments up to 5 cm long, and anthers c. 1.3–2.5 mm long. Gynophore (1.2–) 2–5 (–8) cm long, sometimes pubescent at base; ovary ovate, ellipsoid or cylindrical, 3–6 mm long, with 5–10 carpels and stigma sessile or capitate. Fruit ellipsoid, ovoid, obovoid, pyriform, oblong or globose, usually dehiscent, (0.8–) 1.4–5 (–5.5) × (0.5–) 1–2 (3.3) cm, with pericarp smooth or ribbed and red or yellow–greenish pulp; seeds numerous, reniform, 2–3.8 × 1.6–3.2 mm, reddish–brown.

Distribution:—Southern Europe, northern and eastern Africa, Madagascar, south–western and central Asia, Philippines, Indonesia, Papua New Guinea, Australia and Oceania.

Notes:—As lectotype of *Capparis spinosa*, Burt & Lewis (1949) selected a specimen named *Capparis aculeata* in the Hortus Cliffortianus Herbarium (BM), which is also the generitype of *Capparis* L. (Jarvis 2007). This is a sterile specimen showing recurved, yellowish stipular thorns and obovate–elliptical leaves with retuse apex, shortly mucronate. Zohary (1960) underlined that the exsiccata in the Hortus Cliffortianus under *C. aculeata* does not agree well with the phrase cited by Linnaeus from Bauhin (1623) – *Capparis spinosa, fructu minore, folio rotundo* – and with what is commonly accepted as typical *C. spinosa*. On the contrary, Higton & Akeroyd (1991) stated that this specimen falls within the variability of *C. spinosa* var. *spinosa*, although its leaf morphology is somewhat atypical.

In the present treatment, within sect. *Capparis* a single species is recognized, *C. spinosa*, split into a few subspecies distributed in Eurasia and in several paleotropical areas. The species concept adopted follows the one proposed by different authors for northern Africa, southern Europe and Australia (Maire 1965, Higton & Akeroyd 1991, Fici 2003). Two subspecies are recognized in the study area, i. e. subsp. *spinosa*, showing a wide distribution from the Mediterranean eastwards to central Asia and Nepal, and subsp. *rupestris* (Sm.) Nyman (1878: 68), a Steno–Mediterranean element extending to the central Saharian massifs. Where the distributions of the two subspecies overlap, these are usually differentiated in their habitats. *C. spinosa* subsp. *spinosa* is widespread under various ecological conditions, with special reference to clays, marls and evaporites, while *C. spinosa* subsp. *rupestris* shows a high degree of habitat specificity for rocky outcrops and cliffs (Higton & Akeroyd 1991, Bolòs & Vigo 1984, Marcos Samaniego & Paiva 1993, Fici 2001, Tan 2002). Within each subspecies some varieties are recognized, referred to forms clearly differentiated and prevailing in separate habitats, which in some cases show intermediates in the contact areas (Hedge & Lamond 1970, Blakelock & Townsend 1980). The occurrence of hybridization processes between *C. spinosa* subsp. *spinosa* and *C. spinosa* subsp. *rupestris* in areas where their populations are bordering must also be noted, as recently reported in central Mediterranean by Gristina (2011).

Key to the subspecies of *C. spinosa* in the study area

- 1 Branches spreading or erect, multiramified; stipules conspicuous and thorny, mostly recurved, decurrent at the base; Mediterranean Region, Middle East to China and Nepal..... subsp. *spinosa*
- Branches pendulous, unramified or few–ramified; stipules mostly setaceous or caducous, when persisting straight or slightly recurved, not decurrent at the base; Mediterranean Region, Saharian Massifs..... subsp. *rupestris*

1. *Capparis spinosa* subsp. *spinosa*

C. spinosa subsp. *eu-spinosa* Maire & Weiller in Maire (1965: 118).

C. ovata auct. non Desfontaines (1798: 404): Jalas & Suominen (1991: 103).

Shrub prostrate–spreading or ascending, with branches multiramified up to 2 (–3) m long; young twigs pubescent, white–tomentose or glabrous; epigeal parts frequently desiccating during winter, in this case underground corm present. Stipules thorny, recurved, in some cases straight or horizontal, yellowish or orange, up to 6 mm long, mostly decurrent at the base, occasionally wanting or caducous. Leaves obovate, ovate, orbicular, lanceolate or elliptic, glabrous or pubescent to white–tomentose, (0.5–) 0.8–5 (–7) × (0.4–) 0.5–4.5 (–6) cm, chartaceous to coriaceous or subfleshy, rounded, cordate, truncate, attenuate or cuneate at base, acute, obtuse, acuminate, rounded, truncate or retuse at apex, with a mucro or prickle up to 1 mm, in some cases mucicous; petiole sulcate or entire, glabrous to tomentose, 0–1.5 cm long. Flowers solitary, axillary, noctiflorous, slightly to strongly zygomorphic; pedicels (0.8–) 2.5–4.5 (5.5) cm long, glabrous to pubescent. Sepals broadly oblong or ovate, glabrous to pubescent outside, the posterior more or less saccate, c. (0.8–) 1.3–2.5 cm long, the others (0.7–) 1.2–2.2 cm long. Petals white or pinkish, broadly obovate or oblong, (0.8–) 1.5–3.5 (–4) cm long. Stamens numerous with filaments pinkish or purplish in the upper part, up to 5 cm long, and anthers violet, c. 2 mm long. Gynophore (1.2–) 2–5 cm long, glabrous or pubescent at base; ovary ovate–ellipsoid, 3–5 (–6) × 1.3–1.7 mm, stigma sessile or capitate. Fruit berry–like, dehiscent, ovoid, obovoid–pyriform, oblong, ellipsoid

or globose, (0.8–) 1.4–4.5 (–5.5) × (0.5–) 1–2 (–3.3) cm, mostly with red crimson pulp; seeds numerous, reniform, c. 2–3.8 × 1.6–3.2 mm, reddish–brown.

Distribution:—Southern Europe, northern Africa including Sahara, Arabic peninsula, Middle East to China, Nepal and India.

Notes:—Between the two subspecies recognized in the present treatment, *Capparis spinosa* subsp. *spinosa* shows higher variability and markedly derived characters when compared with the tropical stock of the group (Fici 2001). Its wide distribution range includes the Mediterranean, Irano–Turanian and Saharo–Sindian Regions, reaching in central Asia (Kazakhstan, Xingjiang and Gansu) the highest latitudes for the whole genus *Capparis*. From an ecological point of view, substrata with high concentration of soluble salts, such as clay, gypsum and solonchic soils are frequently recorded among the primary habitats of this subspecies (Bobrov 1970, Hedge & Lamond 1970, Blakelock & Townsend 1980, Bolòs & Vigo 1984, Fici & Gianguzzi 1997), but it is also widespread on limestone, sand, marl, schists, metamorphic substrata, etc. (Marcos Samaniego & Paiva 1993, Tan 2002, Inocencio *et al.* 2006). Subsp. *spinosa* also shows marked plasticity as regards climatic and altitudinal adaptations, as it is recorded from sea level to elevations of over 3500 m in India, Pakistan and Afghanistan. It is widespread in several desert and subdesert areas of Sahara, Arabic peninsula, Middle East and central Asia (Quezel & Santa 1962, Zohary 1966, Boulos 1999, Zhang & Tucker 2008). Furthermore, it is frequently associated with synanthropic habitats such as wastelands, dry fields and roadsides. The var. *spinosa* is recorded in some cases as having escaped from cultivation.

Among the main features of *Capparis spinosa* subsp. *spinosa*, its reduced growth form and high phenotypic plasticity appear of adaptive value in arid, semiarid and continental environments. As regards growth form, a total loss of the epigeal parts of the plant has been frequently observed during the autumn and winter, with an underground corm bearing renewal buds. In order to describe this feature, Zohary (1966) adopted the term “emychriophytic shrub”. A similar reduction in growth forms is known for other woody groups of tropical origin, when irradiating to higher latitudes (Meusel & Kästner 1972, Bell & Hemsley 1992). This subspecies shows a noteworthy inter- and intrapopulational plasticity in the habit, indumentum, stipules and leaf blade (Fici 2001). Considering this remarkable variability, several taxa described in the Mediterranean and Middle East adopting a narrow species concept show scarce systematic value. Based on the above considerations, the complex variability of subsp. *spinosa* is treated here by splitting the subspecies in varieties, referred to forms prevailing in separate habitats. Seven varieties are recognized, mostly showing wide geographical range. For each variety a short description, as well as data on the distribution, autecology and phenology are given.

Uses:—In the Mediterranean, Middle East and central Asia the flower buds, widely collected from wild populations, are pickled and used for flavouring in cooking. In several countries unripe fruits and young shoots are also pickled and used as a condiment. The commercial cultivation of subsp. *spinosa* var. *spinosa* has been recorded in north–western Mediterranean only (Bonnier 1912, Zohary 1960, Bolòs & Vigo 1984, Higton & Akeroyd 1991, Marcos Samaniego & Paiva 1993). The ripe fruit, showing high content of proteins and lipids, is eaten raw by people in Iraq, Iran, Armenia and Uzbekistan, where oil is also extracted from the seeds (Bobrov 1970, Blakelock & Townsend 1980). Animals, especially sheep, goats and camels graze on plants in desert and subdesert zones (Jafri 1973, Elamin 1983). Several therapeutic uses of taxa included here in *C. spinosa* subsp. *spinosa* were recorded by Rivera *et al.* (2003a). Anti–diabetic, anti–fungal, anti–leishmania, expectorant, analgesic and anti–inflammatory properties were reported by Rajesh *et al.* (2009). The bark and root are used for treating arthritis, rheumatism and tooth–ache in Spain, Qatar, Iraq, India, etc., while in Iran the plant is the source of many remedies for snake–bites (Blakelock & Townsend 1980, Elamin 1983, González–Tejero 1989). Roots and root–bark are also used to treat intermittent fevers, and as a diuretic, tonic, antidiarrheal, etc. (Bonnier 1912, Hooper 1937, Al–Rawi & Chakravarty 1964, Arnold 1985). In India, all parts of the plant are considered stimulant and astringent, and used in Ayurvedic medicine as a hepatic protector, improving liver functions (Watt 1908, Alkire 1998), while a jelly prepared from fruits is a remedy for rheumatism (Kiritikar & Basu 1987). In Syria dried leaves steeped in vinegar were utilized for ulcers and head scabs (Campbell Thompson 1949).

Key to the varieties of *C. spinosa* subsp. *spinosa*

- | | | |
|---|--|------------------------|
| 1 | Stipules straight, horizontal or slightly recurved; Anatolia, Caucasus to Kazakhstan and China..... | var. <i>herbacea</i> |
| - | Stipules recurved | 2 |
| 2 | Leaves orbicular, ovate or obovate..... | 3 |
| - | Leaves lanceolate, elliptic or oblong | 6 |
| 3 | Leaves small, pubescent, (0.5–) 0.6–1.4 (–2.0) × 0.5–1.2 (–1.8) cm; flowers small, petals up to 1.7 (–2.0) cm; Arabic Peninsula, Middle East to Pakistan and India | var. <i>parviflora</i> |

- Leaves larger, subcoriaceous or subfleshy, glabrous or glabrescent; flowers larger4
- 4 Leaves 2.4–5 (–7) × 2–4 (–6) cm; petals 2–3.5 (–4) cm long; southern Europe, Middle East, northern Africa var. *spinosa*
- Leaves smaller, petals smaller5
- 5 Leaves with rounded, truncate or retuse apex; Greece, Middle East, Arabic peninsula, northern Africa var. *aegyptia*
- Leaves with acute apex; Morocco var. *atlantica*
- 6 Leaves oblong, elliptic, elliptic–ovate or elliptic–obovate, not coriaceous; Mediterranean Region, Arabic Peninsula, Middle East to Nepal var. *canescens*
- Leaves lanceolate or elliptic, coriaceous; Iran, Afghanistan, Pakistan, Arabic Peninsula var. *mucronifolia*

1a. *Capparis spinosa* subsp. *spinosa* var. *spinosa*

Twigs glabrous or slightly pubescent. Stipular thorns recurved, yellowish, up to 6 mm long. Petiole not sulcate, 0.5–1 cm long. Leaf-blade ovate, ovate–orbicular or obovate, subcoriaceous, glabrous or glabrescent, 2.4–5 (–7) × 2–4 (–6) cm, with base truncate, rounded or cordate, apex obtuse, rounded or retuse, sometimes acute, with mucro c. 0.1–0.5 mm. Flowers slightly zygomorphic. Sepals 1.5–2.5 cm long. Petals 2–3.5 (–4) cm long. Fruit pyriform, ovoid or ellipsoid 2–3.5 (–4.5) cm long. (Fig. 1A).



FIGURE 1. *Capparis spinosa* subsp. *spinosa*. **A.** Var. *spinosa*: A1. Flower. A2. Particular of fruiting branch. A3. Habit. **B.** Var. *canescens*: B1. Flower. B2. Fruit. B3. Habit. **C.** Var. *aegyptia*: C1. Flowers. C2. Particular of branch. C3 Habit. **D.** Var. *herbacea*: D1. Flowers. D2. Fruiting branches. D3. Population in natural habitat. (Photos C1, C2, C3 by V. Ilardi; D1, D2, D3 by H. E. Jiang).

Distribution:—Portugal, Spain, France, Italy, Greece, Turkey, Israel, Egypt, Tunisia and Algeria (Fig. 2). Zohary (1960) also recorded this variety in Iraq, Cyprus and former Yugoslavia.

Habitat:—Rocky habitats, stony slopes, cliffs, wastelands and old walls, on limestone, clay, marl, gypsum; also cultivated and often escaping; 0 – 800 m.

Phenology:—Flowering April–September (–October)

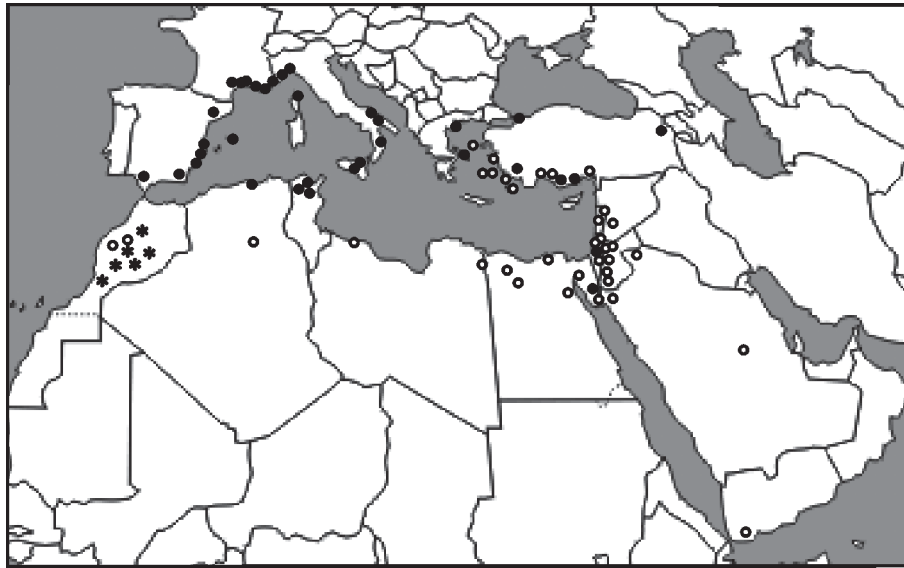


FIGURE 2. Distribution of varieties of *Capparis spinosa* subsp. *spinosa*: var. *spinosa* (●); var. *aegyptia* (○); var. *atlantica* (*).

Notes:—According to Zohary (1960) *C. spinosa* var. *spinosa*, widespread in several Mediterranean and Middle East countries, is characterized by large, round-ovate leaves and the largest flowers of the whole group. In northern Africa, Maire (1965) recorded this taxon—sub *C. spinosa* var. *genuina* Boissier (1867: 420)—as very common in northern and central Tunisia and in the Tell in Algeria, describing it with leaves up to 7 × 6 cm and flowers 5–6 cm in diameter. Higton & Akeroyd (1991) distinguished this variety from the close var. *canescens* Cosson (1849: 28) by its “mostly ovate leaves and larger flowers”, and underlined that it is widespread in western Mediterranean, where selection of plants bearing large flower-buds has been carried out. Cultivation of this variety has been recorded in Catalonia, France and Italy by Bolòs & Vigo (1984) and Blakelock & Townsend (1980). Zohary (1960) hypothesized that, at least in West Europe, typical *C. spinosa* probably escaped from cultivation and its indigenous origin there is dubious. A similar opinion was formerly expressed by Duhamel (1801) who stated that in Mediterranean France it should be considered a naturalized plant, resulting from an ancient introduction by man. This variety was recorded by Marcos Samaniego & Paiva (1993) as also cultivated and subsponaneous in the southern Iberian Peninsula and Balearic Islands. Differently in central Mediterranean var. *spinosa* is clearly indigenous and widespread in natural communities occurring in areas where it has never been cultivated. In Sicily, individuals of var. *spinosa* have been observed along the “Gessoso–Solfifera” Formation under particular edaphic conditions, e.g. clay soils mixed with limestone or gypsum (Fici 2001).

It must be underlined that various authors (Hedge & Lamond 1970, Bobrov 1970, Nyberg 1996, Boulos 1999, Tan 2002) included in typical *C. spinosa* some varieties which have been treated separately here.

Specimens examined:—PORTUGAL. Estremadura: Sacavém, 14 June 1944, *Fontes & Bainha s. n.* (MA); SPAIN. Balears: Majorca, 06 September 1946, *Ferrer s. n.* (MA); SPAIN. Huesca: entre Ballobar y Velilla de Cinca, 15 June 1991, *Pedrol 4494* (MA); SPAIN. Cádiz: Sanlúcar de Barrameda, July 1803, *Clemente s. n.* (MA); SPAIN. Cartagena: 25 April 1926, *Ellman & Sandwith 367* (K); SPAIN. Granada: 12 June 1879, *Huter, Porta & Rigo s. n.* (FI); FRANCE. Hérault: Vendémian, s. d., *Puech s. n.* (MA); FRANCE. Hérault: Vendargues, 1 August 1965, *Blanchet s. n.* (MA); FRANCE. Hérault: Montpellier, route de Grammont, 14 July 1940, *Licent s. n.* (P); FRANCE. Hérault: Thézan lès Béziers talus sous St-René, 23 June 1990, *Amat s. n.* (P); FRANCE. Bouches-du-Rhône: Marseille, October 1842, *s. c.* (MA); FRANCE. Bouches-du-Rhône: Marseille, s. d., *Legris s. n.* (P); FRANCE. Bouches-du-Rhône: Aix-en-Provence, 1850, *Willnott s. n.* (K); FRANCE. Bouches-du-Rhône: Les Rochers en Provence, s. d., *Fray-Fournier s. n.* (P); FRANCE. Var: Toulon, 1 January 1890, *Guillemot s. n.* (P); FRANCE. Var: Toulon, 1842, *Heldreich s. n.* (FI); FRANCE. Var: Env. De Toulon, June 1848, *Bourgeau s. n.* (K); FRANCE. Var: Le Luc, 07.1874, *Cartier s. n.* (FI); FRANCE. Var: Hyères et Toulon, 30 June 1896, *Carion s. n.* (P); FRANCE. Var: Bras, 1 July 1927, *Fiereck 1687* (P); FRANCE. Var: Bandol, September 1925, *Balay 140 b* (P); FRANCE. Vaucluse: Avignon, Les Angles, September 1869, *Fabre s. n.* (P); FRANCE. Vaucluse: Avignon, s. d., *Jordan s. n.* (FI); FRANCE. Alpes-Maritimes: Villafranche pres Nices, 12 June 1861, *Bourgeanin s. n.* (FI); FRANCE. Alpes-Maritimes: Nice, route de la Corniche, 2 September 1900, *Legris s. n.* (P); FRANCE. Provence, September 1887, *Gamble 19714* (K); FRANCE. Corse: Morsiglia,

Cap Corse, 11 June 2000, *Vieil–Cazal s. n.* (P); ITALY. Liguria: Ventimiglia, s. d., *Butler s. n.* (K); ITALY. Liguria: Ventimiglia alla Mortola, 10 September 1892, *Martelli s. n.* (FI); ITALY. Liguria: Piano Marina, 30 July 1898, *Ferrari s. n.* (FI); ITALY. Liguria: presso Verezzi, 15 November 1899, *Mezzana s. n.* (FI); ITALY. Puglia: dintorni di Viesti, 21 May 1893, *Martelli s. n.* (FI); ITALY. Puglia: dirupi di Manfredonia, 27 May 1893, *Martelli s. n.* (FI); ITALY. Sicily: Marianopoli, June 1885, *Lojacono s. n.* (FI); ITALY. Sicily: Milena, 21 July 2010, *Fici s. n.* (PAL); GREECE. Mount Athos: Hagion Oros, September 1905, *Dimo..ie s. n.* (MA); GREECE. Euboea: Chalcis, February 1919, *Iozer s. n.* (K); TURKEY. In Monte Tauro, 1836, *Kotschy 47* (K); TURKEY. Prov. Kars, 1903, *Koenig s. n.* (FI); TURKEY. Antalya: Alanya, Kale, 18 September 1968, *Baytop 14.398* (E); TURKEY. Denizli: Vilayet, 01 July 1973, *Holtz 437, Hänel & Kesercioğlu* (E); ISRAEL. Nablus: Wadi Beidan, 23 April 1942, *Davis 4882* (E); EGYPT. Sinai, June 1832, *Bové 147* (K, P); ALGERIA. Alger, July 1837, *Bové s. n.* (K, P); ALGERIA. Alger: Mustapha, 1879, *Gargoger s. n.* (FI); TUNISIA. Kef, 2006, *E. Saadaoui 15* (PAL); TUNISIA. Chouigui, 2006, *Saadaoui s. n.* (PAL).

1b. *Capparis spinosa* subsp. *spinosa* var. *canescens* Cosson (1849: 28). *C. spinosa* subsp. *canescens* (Coss.) A. Bolòs & O. Bolòs (1961: 88). *C. ovata* var. *canescens* (Coss.) Heywood (1964 b: 56). Type: SPAIN. Buenavista prope Xeres, 19 July 1849, *Bourgeau 43* (holotype P, isotype K).

C. sicula Veill. in Duhamel (1801: 159). *C. spinosa* var. *sicula* (Veill.) Haussknecht (1893: 41). *C. spinosa* subsp. *sicula* (Veill.) Holmboe (1914: 92). *C. ovata* var. *sicula* (Veill.) Zohary (1960: 55). *C. ovata* subsp. *sicula* (Veill.) Pugnaire (1989: 121). Lectotype (designated by Inocencio *et al.* 2006): “Boccone’s image, Icones et descriptiones rariorum plantarum Siciliae, Melitae, Juliae et Italiae: 79. tab. 42. f. 3. 1674”.

C. napaulensis Candolle (1824: 246). Type: NEPAL. s. l., 1821, *Wallich s. n.* (holotype G–DC), *syn. nov.*

C. leucophylla Candolle (1824: 246). *C. spinosa* var. *leucophylla* (DC.) Boissier (1867: 420). *C. sicula* subsp. *leucophylla* (DC.) Inocencio, D. Rivera, Obón & Alcaraz in Inocencio *et al.* (2006: 142). Lectotype (designated by Inocencio *et al.* 2006): IRAQ. “Inter Bagdad et Alep. *Oliv. et Brug.* (v.s. in Herb. Mus Par.)” (lectotype P).

C. obovata Royle (1839: 73). Type: INDIA. Kunawar, Hangoo, s. d., *Royle s. n.* (holotype DD), *syn. nov.*

C. ovata var. *palaestina* Zohary (1960: 56). Type: ISRAEL. Upper Galilee, Wadi Hindaj, 25 June 1954, *Zohary 110* (holotype HUI).

C. sicula subsp. *sindiana* Inocencio, D. Rivera, Obón & Alcaraz in Inocencio *et al.* (2006: 144). Type: AFGHANISTAN. Barak, 26 August 1986, *Lulman 92* (holotype K), *syn. nov.*

C. sicula subsp. *mesopotamica* Inocencio, D. Rivera, Obón & Alcaraz in Inocencio *et al.* (2006: 142). Type: IRAQ. Amara, 9 September 1918, *Evans M/100* (holotype E), *syn. nov.*

Twigs pubescent. Stipular thorns usually recurved, rarely spreading or straight, up to 6 mm long. Petiole sulcate, 0.5–1.5 cm long. Leaf-blade oblong, elliptic, elliptic–ovate or elliptic–obovate, pubescent to densely white–tomentose especially when young, later pubescent to glabrescent, (1.6–) 2–4.2 (–5) × (1.3–) 1.5–3.2 (–4) cm, base usually subtruncate or rounded, apex obtuse or acuminate, rounded or retuse, sometimes acute, mucronate or spinous mucronate, with mucro usually more than 0.5 mm and up to 0.9 mm long. Flower zygomorphic; sepals 1.3–2.4 cm long; petals 1.8–2.8 (–3.5) cm long. Fruit ovoid or spheroid 1.8–4.2 cm long. (Fig. 1B).

Distribution:—Spain, France, Italy, Albania, Macedonia, Greece, Cyprus, Egypt, Libya, Algeria, Morocco, Saudi Arabia, Bahrain, United Arab Emirates, Yemen, Turkey, Syria, Israel, Jordan, Iraq, Iran, Afghanistan, Pakistan, India and Nepal (Fig. 3). This variety has also been recorded in Lebanon, Turkmenistan (Blakelock & Townsend 1980) and Tunisia (Pottier–Alapetite 1979, Le Floc’h *et al.* 2010).

Habitat:—Rocky slopes, foothills, cliffs, steppic plains, dried river–beds, wastelands, roadsides, walls, becoming a weed in cultivations; on clay, marl, limestone and gypsum, often in substrata rich in soluble salts; 0–3600 m.

According to Blakelock & Townsend (1980), *C. spinosa* var. *canescens* is common in the lower forest zone and in the alluvial plains of the desert region in Iraq. In Egypt it is widespread in stony desert wadis and plains (Boulos 1999). Eig (1933) stated that in Palestine this variety “seems to belong principally to the Mediter. element. It is a typical plant of ancient walls, of rocky places and some localities of dry, white senonian slopes”.

Phenology:—Flowering March–September (–October). Prolongating anthesis to December in southern parts of the Arabic peninsula (*Osborn 48*).

Notes:—This is the most widespread variety within *C. spinosa* subsp. *spinosa*, being distributed from the Mediterranean region eastwards to central Asia, India and Nepal (Blakelock & Townsend 1980). Zohary (1960) treated it sub *C. ovata* var. *sicula*, stating that it is common in all Mediterranean countries and underlining its polymorphism. The same author pointed out as differential characters the oblong to elliptical leaves, the pubescence of the stems and buds and the markedly zygomorphic flowers. Maire (1965) recorded this variety as very common in northern Africa

in the Tell, Rif, Middle and High Atlas. Following Higton & Akeroyd (1991), *C. spinosa* var. *canescens* probably represents the native variant of the cultivated plant and is distinguished from *C. spinosa* var. *spinosa* by the leaf morphology, the sulcate petiole and the smaller and more zygomorphic flowers. *Capparis spinosa* var. *canescens* shows marked ecological plasticity over its wide distribution range, occurring on several substrata from sea level to elevations of over 3500 m in south–central Asia. Furthermore, it is frequently linked with communities referred to the class *Pegano–Salsotea* Br.–Bl. & O. Bolòs 1958 (Brullo *et al.* 2012), colonizing substrata rich in soluble salts, such as clays and evaporitic sediments.

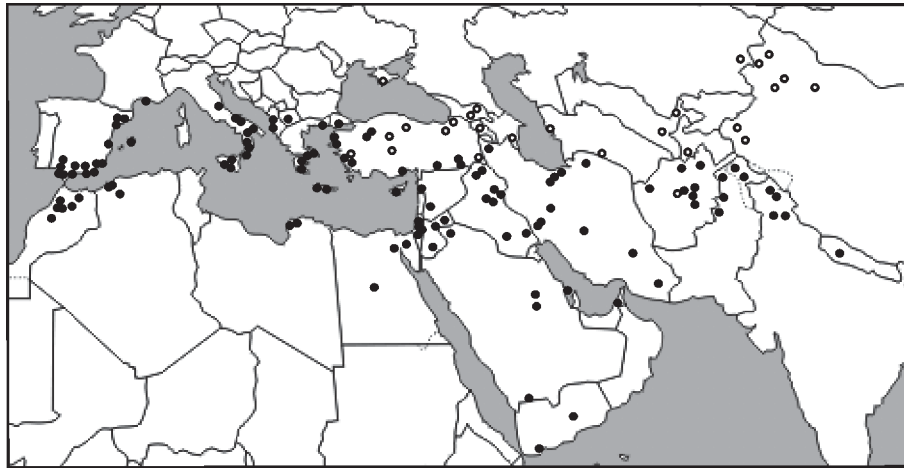


FIGURE 3. Distribution of varieties of *Capparis spinosa* subsp. *spinosa*: var. *canescens* (●); var. *herbacea* (○).

With regard to the marked phenotypical variability of *C. spinosa* var. *canescens*, specimens from eastern Mediterranean and Asia show leaves with longer, stiff mucro. In the easternmost part of the distribution area (Iran, Afghanistan, Pakistan and India) stipular thorns are sometimes spreading or slightly recurved, resembling var. *herbacea* in this feature. Zohary (1960) recorded intermediate forms with *C. spinosa* var. *aegyptia* in eastern Mediterranean. In Sicily *C. spinosa* var. *spinosa* and *C. spinosa* var. *canescens* represent the extremes of a variation pattern related to the edaphic conditions (Fici 2001).

In the past, several taxa were described on the basis of quantitative characters falling within the plasticity of this variety. Among these, a form showing white–tomentose, spinous–mucronate leaves and small flowers, widespread in the dry steppe zones and desert regions of Iraq, Jordan and Iran (Blakelock & Townsend 1980), was described as *C. leucophylla*. Another form characterized by soft, villous indumentum and slightly larger sepals and petals, recorded in semidesert areas of the Middle East and Egypt, has been described as *C. ovata* var. *palaestina*. Two species described from Nepal and northern India (Jacobs 1965), *C. napaulensis* and *C. obovata*, are also to be referred to as *C. spinosa* var. *canescens*.

C. spinosa var. *canescens* is recognized in several floristic works from the Mediterranean and Middle East (Maire 1965, Coode 1965, Meikle 1977, Pottier–Alapetite 1979, Blakelock & Townsend 1980, Higton & Akeroyd 1993, Marcos Samaniego & Paiva 1993, Boulos 1999). Differently other authors included this variety among the synonyms of typical *C. spinosa* (Hedge & Lamond 1970, Bobrov 1970, Nyberg 1996, Tan 2002). Recently, Inocencio *et al.* (2006) treated this taxon at specific rank, sub *C. sicula*.

Specimens examined:—SPAIN. Alicante: alrededores de Villajoyosa y monte de la Torreta, 22 June 1935, *Martinez s. n.* (MA); SPAIN. N. Murcia: Javali, 28 May 1986, *De Castro s. n.* (MA); SPAIN. Murcia: Cartagena, 26 July 1973, *Segura Zubizarreta 5750* (MA); SPAIN. Cádiz: entre Sanlúcar y Trebujena, 9 July 1968, *Silvestre & Valdés 2524/68* (MA); SPAIN. Jaen: Cabra de Santo Cristo, August 1913, *Beltran s. n.* (MA); SPAIN. Almeria: Alcolea, 4 August 1981, *Rico s. n.* (MA); SPAIN. Almeria: 3 miles W. of town, 29 May 1924, *Ellman & Hubbard 904* (K); SPAIN. Cadiz, 1826, *Willmott s. n.* (K); SPAIN. Balears: Mallorca, 10 August 1952, *s. c. 405* (MA); SPAIN. Balears: Majorca, August 1932, *Leggett 6* (K); SPAIN. Cordoba, July 1995, *Ottonello s. n.* (PAL); FRANCE. Aix: Bouches–du–Rhône, August 1873, *Haridt s. n.* (K); ITALY. Abruzzo: Roseto degli Abruzzi, 2 November 1998, *Pirone s. n.* (PAL); ITALY. Puglia: Lago Salso presso Manfredonia, 02.06.1893, *Martelli s. n.* (FI); ITALY. Puglia: Gargano, Monte S. Angelo, 14 July 1898, *Fiori s. n.* (FI); ITALY. Calabria: Marina di Crotona, June 1911, *Lopez s. n.* (FI); ITALY. Calabria: Castrovillari, July 1885, *Terracciano s. n.* (RO); ITALY. Calabria: Cosenza, Lungro, nei pressi della Salina, 23 July 1902, *Longo s. n.* (RO); ITALY. Calabria: Sibari, 19 June 1898, *Rigo 411* (B); ITALY. Calabria: Piana di Sibari, 8 August 1995, *Fici s. n.* (PAL); ITALY. Calabria: Oriolo, 07 August 1995, *Fici s. n.* (PAL); ITALY. Sicily:

Girgenti, s. d., *Todaro s. n.* (RO); ITALY. Sicily: Girgenti, July/September 1903, *Ross 313* (B); ITALY. Sicily: Sommatino, July 1901, *Martelli s. n.* (MA); ITALY. Sicily: Caltanissetta, contrada Aquileia, 10 July 2012, *Anzalone s. n.* (PAL); ITALY. Sicily: Porto Empedocle, 18 June 1965, *Brummitt, Hunt & Leistner 5213* (K); ALBANIA. Infra Levani et Frascula, 17 August 1894, *Baldacci 197* (K, FI, RO); ALBANIA. Valona: ad Valonam, 1889, *Baldacci s. n.* (K, FI, RO); MACEDONIA. Negotino: Krivolak, 17 July 1929, *Lindtner s. n.* (K); GREECE. Euboea: Eretria, 20 June 1973, *Stamatiadhou 17290* (MA); GREECE. Attica: Athenas, August/October 1847, *Heldreich s. n.* (FI); GREECE. In Attica, s. d., *Heldreich s. n.* (B); GREECE. Attica: near Athens, July/August 1891, *Dorfler s. n.* (MA); GREECE. Attica: valley of Kiphinos, July 1931, *Atchley 826* (K); GREECE. Attica: circa Athenas, 1891, *Cortesi s. n.* (RO); GREECE. Thrace: Tabakkeuy, 16 September 1932, *HGT 864* (K); GREECE. Crete: Kissamos, Kissamu–Kastelli, 14 June 1943, *Bickerich 15091* (K); GREECE. Crete: Candia, 12 May 1915, *Gandoger 9047* (K); CYPRUS. Athalassa, 10 July 1970, *Genneoy 1552* (K); CYPRUS. Distr. Kyrenia, 20 May 1973, *Laukkonen 323* (K); CYPRUS. Larnaka: Skarion, 23 May 1941, *Davis 3592 A* (K); CYPRUS. Between Kalavastos and Tenda, 18 May 2010, *Fici s. n.* (PAL); EGYPT. Cairo: Mokkatam, January 1903, *Mushler s. n.* (K); EGYPT. Northern Sinai: 51 km southeast of Nekhel, 18.04.2003, *Boulos 20107* (K); EGYPT. Farafra Oasis: Ain Sheminada, 04 April 1984, *El-Ghani 7104* (K, E); LIBYA. Bengasi, s. d., *Zanon s. n.* (FI); LIBYA. Bengasi: Auà Zarda, 7 November 1915, *Zanon s. n.* (FI); ALGERIA. Environs d'Oran, 24 August 1929, *Faure s. n.* (K); ALGERIA. Oran: Santa-Cruz, 24 August 1930, *Faure s. n.* (K); ALGERIA. Oran: Santa-Cruz, 18 July 1889, *Doumerguel s. n.* (MA); ALGERIA. Oran, August 1844, *Munby s. n.* (K); ALGERIA. Oran, 1892, *Debeaux s. n.* (FI); ALGERIA. Oran, 02 June 1884, *Debeaux s. n.* (MA); ALGERIA. Saida, s. d., *Gaillardot s. n.* (E); MOROCCO. Ida Oubakil, 1875, *Beaumier s. n.* (K); MOROCCO. Fès: Bab Zitouna, Jbel Zalagh, 16 June 1993, *Molero, Montserrat, Pallàs, Vicens & Veny JMM-3752/5* (RNG); MOROCCO. Zerhoun, c. 25 km NNE of Meknès, 05 June 1994, *Jury 15052* (RNG); TURKEY. Mersin: Keşlit Urkmeli, 65 km SW of Mersin, 12 May 1959, *Hennipman, Nijoff, Swennen, Tulp, Wader & de Wilde 273* (K); TURKEY. Uifa: Cumcume, 05 August 1982, *Miller 801* (K); TURKEY. Diyarbakir: Diyarbakir–Silvan, 24 June 1954, *Davis 22097* (K, E); TURKEY. Mardin, 23 June 1888, *Sintenis 1168* (K, E); TURKEY. Anatolien, Sariyar im Sakaryatal, 28 April 1955, *Walter 1451* (B); TURKEY. Aydin, Kuşadasi, 1967, *Schultz 40* (E); TURKEY. Between Tekirdağ and Barbaros, 07 August 1967, *Baytop 11801* (E); TURKEY. Assos, 18 June 1883, *Sintenis 746* (E); TURKEY. Denizli: Denizli–Aydin, 16 miles from Sarakby, 03 June 1962, *Dudley 35364* (E); SYRIA. Wadi Rutga, 20 May 1934, *Field & Lazar 359* (K); SYRIA. Between Damascus and Mezze, *Gaillardot 413* (K); SYRIA. Near Damascus, 21 May 1932, *Samuelsson 1518* (K); SYRIA. Ruines d'Apamée, 08 October 1989, *Leonard 7430* (E); ISRAEL. Palestine: Wadi Beidan, Nablus, 23 April 1942, *Davis 4582* (K); ISRAEL. Palestine: near Gilboa, 17 May 1942, *Davis 4668* (K); ISRAEL. Palestine: Jerusalem, Mt. Scopus, 22 May 1931, *Amdursky s. n.* (MA, RO); JORDAN. Vicinity of Qasr'Amra, Azraq Oasis area, 25 April 1974, *Boulos s. n.* (MA); JORDAN. Qasr'Amra, 25 km SW of Azraq Oasis, 14 May 1976, *Täckolm, El-Hadidi, Lahham & Boulos 9170* (K); JORDAN. 1955, *M.E.D.P. S/1113* (K); JORDAN. Wadi Aseikhim, S. of Jebel Aseikhim, 06 May 1965, *Townsend 65/415* (K); JORDAN. Kasr Burqu, 14 May 1934, *Field & Lazar s. n.* (K); JORDAN. El-Jafr, 24 June 1975, *Al-Eisawi s. n.* (K); JORDAN. Burqu, 30 km Northwest of H4, 16 August 1988, *Woods 4* (E); SAUDI ARABIA. 5 km N of Turayf camp, 6 April 1983, *Collenette 4277* (K); SAUDI ARABIA. 10–20 km south of Rumah E. province, 3 March 1979 – 14 March 1979, *White 73* (K); SAUDI ARABIA. Ar-Riyadh, 20 km NW Riyadh bei Diriyah, 27 March 1981, *Frey, Kürschner & El-Sheikh VO 6504* (E); SAUDI ARABIA. Najran, 11 March 1980, *Collenette 2066* (E); BAHRAIN. Magabah – Buguwah, March 1979, *Virgo 21* (K); BAHRAIN. Near Salambad, 17 March 1970, *Gallagher 58* (K); BAHRAIN. Nabbi Salil Island, 12 March 1952, *Good s. n.* (K); BAHRAIN. SE of Dumiston, 30 May 1984, *Cornes 181* (E); BAHRAIN. s. l., 26 July 1984, *Alder 20* (E); BAHRAIN. Sitra, near Manama, 17 April 1985, *Boulos & Al-Hasan 15577* (E); UNITED ARAB EMIRATES. Dubai: Jebel Hafir, 11 March 1986, *Müller-Hohenstein 86134* (E); YEMEN. Aden: Red Garden, El Rad Garden, 08 December 1957, *Osborn 48* (K); YEMEN. Hadramouth: Sayun, 16 June 1987, *Boulos, Rowaished, Gifri, Saeed & Hussein 17032* (E); IRAQ. Baghdad, 28 May 1956, *Polunin & Duri s. n.* (FI); IRAQ. Bekhme Gorge, 14 May 1947, *Gillett 8230* (K); IRAQ. N of Mosul, 1929, *Rogers 417* (K); IRAQ. Samarra, 1863, *Schafli 46* (K); IRAQ. 43 km from Baghdad, 14 September 1959, *Osham Azaul 15558* (K); IRAQ. Southern Desert, Faithat–Al-Mlais, 23 March 1960, *Rawi, Katili & Tikrity s. n.* (K); IRAQ. c. 70 km SW of Samawa, 22 April 1957, *Guest, Rawi & Reching 18726* (K); IRAQ. Kifri, 12 April 1947, *Gillett & Rawi 7410* (K); IRAQ. 4 km N of Saádiya, 17 July 1975, *Al-Kaisi 42894* (K); IRAQ. Al Hauram 73 km from Rahba, 01 April 1973, *Karim, Noori, Hamid & Kadhim 39981* (K); IRAQ. Mosul: Prov. Hakari, inter Mosul et Zakho, 103 km a Mosul, 02 July 1957, *Reching 10665* (E); IRAN. 34 km south of Amol, 06 July 1969, *Andersen & Petersen 244* (K); IRAN. Nasjid-i-Sulayman, 19 July 1948, *Lee 68* (K); IRAN. Mazandaran, Elburz Mountains, above Sari, 15 June 1960, *Furse & Singe 491* (K); IRAN. Gulestan Forest, 20 August 1966, *Furse 9021* (K); IRAN. N of Khoi, 08 June 1929, *Cowan & Darlington 1560* (K); IRAN. Taft, 18 April 1963, *Bowles Scholarship Bot. Exp. 884* (K); IRAN. Gotvend, Rio Karum,

May/June 1899, *de Escalera 43683* (MA); IRAN. Kerman: Montes Djamal Bariz inter Bam et Djiraf, 08–10 May 1948, *K. H. & F. Rechner 3708* (E); IRAN. Mazanderan, Haraz Valley near Panjab, 12 May 1959, *Wendelbo 683* (E); IRAN. 20 km NW of Nahabad, 22 May 1962, *Furse 2204* (E); IRAN. Sistan, November 1964–March 1965, *Henderson 22* (E); AFGHANISTAN. Mashad or Faisabad Bedderkshan, 19 May 1964, *Furse 6109* (K); AFGHANISTAN. Qala Nau to Morghab, 04 June 1966, *Furse 7735* (K); AFGHANISTAN. Samangan, Tashkurghan Gorge, 15 May 1969, *Hewer 1128* (K); AFGHANISTAN. Baghlan province, 56 miles S. W. of Doshi on road to Bamian, 23 May 1969, *Hewer 1153* (K); AFGHANISTAN. Panjshir, s. d., *Gibbons 393* (K); AFGHANISTAN. Kelpeten, Daschtirewat, 30 July 1966, *Togashi s. n.* (TI); AFGHANISTAN. Parvan: Salang Pass S. side, 25 June 1965, *Lamond 2048* (E); PAKISTAN. Waziristan, Sheikhmela, 11 April 1968, *Yasni & Mahmood 4601* (K); PAKISTAN. Chitral: Shushi Mullah, May 1908, *Toppin 360* (K); PAKISTAN. Khyber–pass, E side, 20 April 1969, *Freitag 4889* (E); PAKISTAN. Skardu, 04 August 1876, *Clarke 30039* (K); PAKISTAN. Iskardo, Balti, 1847, *Winterbottom s. n.* (K); PAKISTAN. Kashmir, Skardu, 24 June 1955, *Webster & Nasir 5771* (K); PAKISTAN. Gilgit, Mhnu Gah Nala, 01 September 1950, *Thornley 41* (TI); INDIA. Kashmir, Lamayuru, Ladakh, 03 July 1976, *Billiett & Leonard 6801* (K); INDIA. Kashmir, Ladakh, August 1934, *Kohli 11* (K); INDIA. Kashmir, Ladakh, 16 June 1928, *Osmaston 36* (K); INDIA. Kashmir, Nubra Valley, January 1927, *Clifford 39* (K); INDIA. Indus Valley, 18 September 1848, *Thomson s. n.* (K); INDIA. Indus Valley, 08 July 1848, *Thomson s. n.* (K); INDIA. Spiti Valley, 25 August 1847, *Thomson s.n.* (K); INDIA. Kashmir, Lamayru, Treaty Road, Ladak, 07 June 1941, *Ludlow & Sherriff 8385* (TI); NEPAL. Phulcangi, Phuli Bheri R., November 1952, *Polunin, Sykes & Williams 3325* (BM).

1c. *Capparis spinosa* subsp. *spinosa* var. *aegyptia* (Lam.) Boissier (1867: 420). *C. aegyptia* Lamarck (1785: 605). *C. spinosa* subsp. *aegyptia* (Lam.) Kit Tan & Runemark in Tan (2002: 114). Lectotype (designated by Inocencio *et al.* 2006): EGYPT. “Lippi a observé ce Caprier en Egypte (v. s. in herb Isn.)” (lectotype P–JU).

- C. sinaica* Veill. in Duhamel (1801: 144). Lectotype (designated by Rivera *et al.* 2003b): “T. 112 in Shaw, Cat. Pl. Variis Afr. (1738)”.
- C. spinosa* var. *pubescens* Zohary (1960: 53). Type: EGYPT. Galala, 7 December 1944, *Davis 8062* (holotype K), *syn. nov.*
- C. spinosa* var. *aravensis* Zohary (1960: 53). Type: ISRAEL. Judean Desert, Ein Fara, 26 December 1942, *Davis 5048* (holotype E, isotype K).
- C. spinosa* var. *deserti* Zohary (1960: 54). *C. deserti* (Zohary) Täckholm & Boulos (1974: 14). Type: EGYPT. Wadi Nosz, entrance to Wadi Lehiani (Bir Derheba), 27 March 1944, *Davis & Feinbrun 5076–7* (holotype HJ).
- C. zoharyi* Inocencio, D. Rivera, Obón & Alcaraz in Inocencio *et al.* (2006: 145). Type: SPAIN. El Llano del Beal, Murcia, 7 July 1999, *Inocencio 42689* (holotype UMH, paratypes *Inocencio & Alcaraz 70102, 70103, 48689*, K, E, MO), *syn. nov.*
- C. hierosolymitana* Danin (2010: 181). Type: ISRAEL. Jerusalem, walls facing west of Old Jerusalem, 27 July 1999, [*Danin*] (holotype HJ, isotypes E, B, PAL, K), *syn. nov.*

Twigs glabrous or glabrescent, rarely pubescent, often glaucous in the upper part. Stipular thorns usually recurved, up to c. 6 mm long. Petiole c. 0.5–1 cm long. Leaf–blade orbicular, orbicular–cuneiform, ovate–orbicular or obovate, mostly becoming glabrous, subfleshy, often glaucous or blue–glaucous, (0.9–) 1.6–2.5 (–3.7) × (0.8–) 1.–2.4 (–3.5) cm, rounded, cordate or cuneate at base, rounded, truncate or retuse at apex, with short mucro or prickle to c. 0.5 mm long. Flower slightly zygomorphic; sepals 1.1–1.7 cm long; petals (1.2–) 1.4–2 (–3) cm long. Fruit ovoid or pyriform, (2–) 2.4–4 (–5.5) × 1–2 (–3.3) cm. (Fig. 1C).

Distribution:—Greece, Turkey, Lebanon, Syria, Israel, Jordan, Egypt, Libya, Algeria, Morocco, Saudi Arabia and Yemen (Fig. 2). Also recorded in Iran, Afghanistan, Tunisia and Qatar (Zohary 1960, Maire 1965, Elamin 1983, Le Floc’h *et al.* 2010).

Habitat:—Rocky slopes, hillsides, cliffs, wadis, walls, roadsides, ruins; on limestone, granite, gypsum, sand and rendzina soils; 0–2000 m.

Phenology:—Flowering March–September. Anthesis prolonged to December in the eastern part of the distribution range, as in *Boulos 5856* from Jordan.

Notes:—This taxon was described by Lamarck (1785) as a separate species, *C. aegyptia*, characterized by small, rounded–cuneate and glaucous–bluish leaves, and later reduced by Boissier (1867) to a variety of *C. spinosa*. The lectotype, kept in Herbarium Isnard (P–JU), was presumably collected in Egypt by D. Lippi at the beginning of the 18th century (Inocencio *et al.* 2006). According to Zohary (1960), var. *aegyptia*, widespread in northern Africa and Middle East, is a well–defined taxon in herbarium, although rather polymorphous in leaf shape and dimensions. The same author underlined the presence of specimens intergrading with *C. spinosa* var. *sicula* (= var. *canescens*) in Cyprus and Morocco. Var. *aegyptia* is recorded as the common caper in Palestine and Egypt, where it is often associated

with the *Hyparrhenia hirta* (L.) Stapf communities (Zohary 1966, Inocencio *et al.* 2006). Various taxa at specific and infraspecific rank, described from the Mediterranean and Middle East on the basis of habit, indumentum, stipules and leaf characters, appear to be forms falling within the plasticity of this variety.

C. spinosa var. *aegyptia* is recognized in various floristic works from northern Africa and the Middle East (Maire 1965, Pottier–Alapetite 1979, Coode 1965, Elamin 1983, Boulos 1995). In Flora Hellenica (Tan 2002) it was raised to a subspecies of *C. spinosa*, while Inocencio *et al.* (2006) reinstated its status of separate species. In some cases this variety has also been included among the synonyms of *C. spinosa* var. *spinosa* (Hedge & Lamond 1970, Nyberg 1996, Boulos 1999).

Specimens examined:—GREECE. Rhodos Island: Haraki, 15 May 1983, *Boratyńska, Boratyński, Browicz & Dolatowski 158* (K); TURKEY. Antalya, 15 June 1958, *Bevington Smith 4* (K); TURKEY. Alanya, 26 May 1966, *Baytop, Baytop & Çubukçu 9701* (E); TURKEY. Çukurova, Tarsus, 19 June 1967, *Deaver T 207* (E); LEBANON. Wadi Sislamin above Harmel, 16 August 1945, *Davis 9864* (K, E); LEBANON. 22 July 2004, *Blythe, Khairallah & Van Slageren MSSKLB 1581* (K); LEBANON. Beirut, 9 June 1941, *s. c.* (E); SYRIA. Snida, 15 June 1856, *Gaillardot 811* (K); SYRIA. Between Tahônet Zeitun and Tahônet Schakra, west of Damascus, 20 July 1856, *Gaillardot 812* (K); ISRAEL. Palestine, 9 November 1907, *Buenaventura Ubach s. n.* (MA); ISRAEL. Palestine, Wadi Kalt, 17 June 1941, *Davis 3654* (K, E); ISRAEL. Nazareth, 17 May 1911, *Meyers 4062* (K, E); ISRAEL. Between Kfar Gileh and Manara, 14 August 1962, *Curle 65* (K) & *143* (E); ISRAEL. Near Gericho, 1917–18, *White s. n.* (K); ISRAEL. Wadi Garnuk, 28 April 1942, *Davis 4604* (K, E); ISRAEL. Jerusalem, June 1911, *s. c.* (K); ISRAEL. Palestine: Wadi Hanan, Miqdal, 13 June 1942, *Davis 4881* (E); ISRAEL. Sarona, 12 July 1912, *Meyers & Dinsmore 8062* (E); ISRAEL. 6 July 1911, *Dinsmore 6062* (E); ISRAEL. Palestine, Maris Mortui, Wad el-Kelt, 2 August 1912, *Meyers & Dinsmore 62C* (E); ISRAEL. Wadi Kelt, near Monastery of St. George, 17 April 1941, *Lewis 3654* (E); JORDAN. Petra, 30 April 1963, *Gillett 15961* (K); JORDAN. Jarash, 2 December 2004, *Abulaila, Saifa & Tehabshem 2004JOR66–1* (K); JORDAN. Wadi Mujib, midway Madaba–Karak road, 21 December 1973, *Boulos 5856* (K); JORDAN. Ma'an, Petra, 3 August 2004, *Abulaila & Tehabsem 2004JOR57–1* (K); JORDAN. 6–7 km south Rum Rest House, 23 March 1975, *Boulos, Jallad, Lahham & Abu Hmaidan 7636* (E); JORDAN. Ma'an, Wadi Rum, 27 July 1980, *Frey, Hilger & Kürschner VO 5856* (E); EGYPT. Mergheb, 27 April 1910, *Mushler s. n.* (K); EGYPT. S. Sinai: Gebel Ez Zebir, 25 May 1969, *Tadmor S–417* (K); EGYPT. S. Sinai: Gebel Talbi, 25 km SE of Monastery, 5 September 1968, *Tadmor & Shmida S–420* (E); EGYPT. Between Cairo and Keneh, 20 June 1867, *Schweinfurth 993* (K); EGYPT. Qattara Depression, El-Saghir Oasis, 24 January 2003, *Boulos 20042* (K); EGYPT. 130 Km on the road from Matruh to Siwa Oasis, 27 October 1963, *Boulos s. n.* (K); EGYPT. Sues, Dchebel Ataka, 18 May 1908, *Bornmüller 10384* (E); LIBYA. Scegga, 5 August 1925, *Krüger s. n.* (FI); LIBYA. Tripoli, June 1854, ... (E); ALGERIA. Gardaia, 6 December 1856, *s.c. 3* (E); MOROCCO. Djebel Couchka, 26 June 1876, *Ibrahim s. n.* (K); MOROCCO. Haut Atlas: Tiz–N–Test pass, 31 March 1972, *Bramwell, Richardson & Murray 492* (K); SAUDI ARABIA. Durahiyeh, 12 miles N.W. of Riyadh, 24 October 1937, *Dickson 386* (K); SAUDI ARABIA. Wadi Lakus, Jabal Lauz area, 2 August 1989, *Collette 7228* (K, E); SAUDI ARABIA. Wadi Qaraqir, 3 March 1995, *Collette 9305* (E); YEMEN. Aden: Bir Ahmed, Wadi Tuban, 8 June 1987, *Boulos, Gifri, Saeed & Hussein 16598* (K).

1d. *Capparis spinosa* subsp. *spinosa* var. *mucronifolia* (Boiss.) Hedge & Lamond (1970: 7). *Capparis mucronifolia* Boissier (1843: 3). Lectotype (designated by Inocencio *et al.* 2006): IRAN or OMAN. “Hab. In Persia australi et in Regno Mascatensi, *Aucher Eloy 4189*” (lectotype G, isolectotype K).

Capparis elliptica var. *maskatensis* Hausskn. & Bornm. ex Bornmüller (1894: 49). Lectotype (designated by Inocencio *et al.* 2006): OMAN. “Arabia australis: in saxosis ad Maskat, 25 May 1893, *Bornmüller 46*” (lectotype JE).

Young twigs densely pubescent to glabrescent. Stipular thorns usually recurved, up to 6 mm long. Petiole 0–4 mm long. Leaf-blade lanceolate or elliptic, coriaceous, glabrous or slightly puberulous when mature, 1–3.5 (–) × 0.4–1.8 cm, usually rounded at base, acute at apex, with mucro c. 0.5–1 mm. Flower slightly zygomorphic; sepals (0.8–) 1–1.8 cm long; petals (0.9–) 1–2.5 cm long. Fruit ellipsoid to obovoid (1.9–) 2.5–4.5 × 1–2 cm long.

Distribution:—Pakistan, Iran, Afghanistan, Qatar, Oman, United Arab Emirates and Saudi Arabia (Fig. 4).

Habitat:—Rocky slopes, stony and gravelly plains, cliffs and wadis; on granite, limestone, sand, conglomerates; 0–1676 m. Recorded in the drier sub-desert regions of southern Iran and Pakistan by Hedge & Lamond (1970).

Phenology:—Flowering March–September.

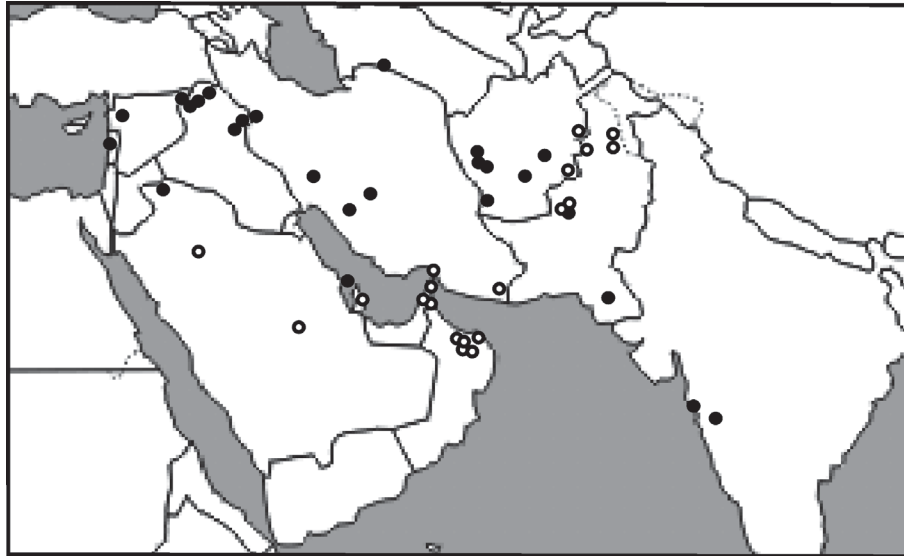


FIGURE 4. Distribution of varieties of *Capparis spinosa* subsp. *spinosa*: var. *parviflora* (●); var. *mucronifolia* (○).

Notes:—This taxon was firstly described by Boissier (1843) as *C. mucronifolia*, on material collected in southern Iran or Oman. Later, the same Author (Boissier 1867) included this binomial among the synonyms of *C. spinosa* var. *parviflora*. More recently, Hedge & Lamond (1970) instituted the new combination *C. spinosa* var. *mucronifolia*, recording this variety in Iran, Pakistan and the Arabic Peninsula and underlining that its typical form has narrow, coriaceous leaves with a length/breadth ratio of more than 3. However, in specimens from Kalat, Kurram and Kyber pass, leaf length/breadth ratio is lower, resembling var. *parviflora* in some cases. Other authors (Zohary 1960, Inocencio *et al.* 2006), adopting a narrower species concept, treated this taxon as a separate species. Jafri (1973) did not mention this variety in Flora of West Pakistan.

C. elliptica Hausskn. & Bornm. ex Bornmüller (1894: 49), a later homonym of *C. elliptica* Span. ex Mueller (1875: 172), is to be referred to var. *mucronifolia*.

Specimens examined:—PAKISTAN. From Thal to Kuram, 11 July 1880, *Aitchinson 320* (K); PAKISTAN. “Scind”, s. d., *Stocks s. n.* (K); PAKISTAN. Punjab: Rawalpindi, 20 September 1870, *Aitchison 170* (K); PAKISTAN. Punjab: Rawalpindi, Sohan, 10 April 1922, *Steward 7039* (K); PAKISTAN. Baluchistan: Quetta, 01 June 1952, *Ciodschank 97* (K); PAKISTAN. Baluchistan: Pil Rift, 04 August 1888, *Lace 3938* (K); IRAN. Zahedan Province: 31.5 miles S of Rask, 21 March 1971, *Grey–Wilson & Hewer 263* (K); IRAN. Hengham Island, May 1879, *Perry s. n.* (K); AFGHANISTAN. s. l., s. d., *Griffith 1430* (K); AFGHANISTAN. Khost, near Domandae, 22 August 1967, *Freitag 1941* (E); AFGHANISTAN. Prov. Nangarhart: 5 km W of Jalalabad, 1 May 1969, *Hedge, Wendelbo & Ekberg W 7468* (E); QATAR. 35 km N of Doha, 08 April 1975, *Baiwa 1128–75* (K); OMAN. Wadi Mu–aydin, near Birkat Al Maws, 09 March 1976, *Radcliffe–Smith 3848* (K); OMAN. 1 km S of Istal, Wadi Bani Kharūs, 27 March 1976, *Radcliffe–Smith 4045* (K, E); OMAN. Ruwi near Muscat, 11 September 1984, *Miller 6003* (K); OMAN. Rostaq, 17 August 1982, *Lawton 2374* (K); OMAN. Muscat to Nizwa Rd., Izki to Fahud turnoff, 18 September 1979, *Miller & Whitcombe 2015* (E); OMAN. Musandam, Wadi between Bayth ash Sheikh and Salistam, 18 March 1994, *McLeish 3915* (E); OMAN. Musandam, c. 16–44 km from Khasab on road to Diba, 15 March 1994, *McLeish 3706* (E); UNITED ARAB EMIRATES. Abu Dhabi: Hatta, 25 March 1981, s. c. *BW22* (K); UNITED ARAB EMIRATES. Fujairah, 22 February 1980, *Lumley 38* (K); UNITED ARAB EMIRATES. Masafi, 6 April 1984, *Skene s. n.* (E); SAUDI ARABIA. Jabal Aja, SW of Hail, 25 April 1986, *Collenette 5701* (K, E); SAUDI ARABIA. 55 km W of Riyadh, 27 April 1986, *Collenette 5844* (K, E).

1e. *Capparis spinosa* subsp. *spinosa* var. *parviflora* (Boiss.) Boissier (1867: 420). *C. parviflora* Boissier (1843: 4). *C. leucophylla* var. *parviflora* (Boiss.) Zohary (1960: 59). Type: IRAN. “Hab. In Persia australi, *Aucher Eloy 4191, 4191–A*” (syntypes G, K).

C. murrayana Graham (1839: 9). Type: INDIA. “*Graham ?*, India, Mahableshtar, or *Gibson*, India, Loghur, *Malcolm*, Hurrychunderjee”, fide Jacobs 1965.

C. parviflora subsp. *sphaerocarpa* Inocencio, D. Rivera, Obón & Alcaraz in Inocencio *et al.* (2006: 139). Type: AFGHANISTAN. Herat, 105 Km S Herat versus Shindand, 7 August 1967, *Rechinger 37579* (holotype E, isotype K), *syn. nov.*
C. parviflora subsp. *kurdica* (Zohary) Inocencio, D. Rivera, Obón & Alcaraz in Inocencio *et al.* (2006: 139). *C. ovata* var. *kurdica* Zohary (1960: 59). Type: IRAQ. Rupes Mt. Singarae, Mai 1867, *Hausknecht s.n.* (holotype K).

Twigs thin, short and often congested, pubescent when young. Stipular thorns recurved, up to 5 mm long. Petiole 1.5–5 mm long. Leaf-blade ovate, oblong–ovate, orbicular or obovate, not coriaceous, more or less pubescent, (0.5–) 0.6–1.4 (–2.0) × 0.5–1.2 (–1.8) cm, rounded or shortly attenuate at base, obtuse, truncate or rarely acute at apex, with mucro or prickle up to 0.5 mm. Flower slightly zygomorphic; sepals (0.7–) 0.9–1.4 cm long; petals (0.8–) 1.0–1.7 (–2.0) cm long. Fruit ellipsoid to globose (0.8–) 1.2–1.7 (–2.0) × (0.5–) 0.8–1.0 cm long.

Distribution:—Syria, Lebanon, Bahrain, Saudi Arabia, Iraq, Iran, Afghanistan, Turkmenistan, Pakistan and India (Fig. 4). Recorded in Israel and Egypt by Hedge & Lamond (1970).

Habitat:—Stony slopes and plains, cliffs, rocky places, roadsides; on limestone, sandstone and claypans. 0–1850 m. Recorded as growing in semi–desert, uncultivated zones in Flora Iranica (Hedge & Lamond 1970). This variety has been reported as occasional in rocky areas of the lower forest zone in Iraq (Blakelock & Townsend 1980).

Phenology:—Flowering March–August.

Notes:—This taxon was firstly described by Boissier (1843) as *C. parviflora* on material from southern Iran, and later reduced by the same author (Boissier 1867) to a variety of *C. spinosa*. According to Hedge & Lamond (1970) *C. spinosa* var. *parviflora* is widespread from northern Africa eastwards to central Asia, and is characterized by small, ovate–orbicular leaves, short internodes and small flowers and fruits. The same authors reported a variation range from extreme forms with short twiggy branches and reduced leaves to individuals with larger leaves close to var. *mucronifolia*. Following Blakelock & Townsend (1980), leaves are broadly ovate or oblong–ovate, pubescent, more or less acute and spinous–mucronate in Iraq.

The disjunct populations of *C. spinosa* in western Deccan, Maharashtra State – originally described by Graham (1839) as *C. murrayana* – belong to this variety. According to Jacobs (1965), the *locus classicus* of this species is Mahableswar, Loghur or Hurrychunderjee. Inocencio *et al.* (2006) did not indicate a holotype since the John Graham Herbarium was not found.

Other authors provided different interpretations of this taxon: Zohary (1960) transferred this variety to *C. leucophylla*, while Inocencio *et al.* (2006) reinstated its specific rank. Jafri (1956) included var. *parviflora* among the synonyms of *C. spinosa* s. l.

Specimens examined:—SYRIA. Between Aleppo and Hama, Naaret en Noman, 15 March 1933, *Samuelsson 5579* (K); LEBANON. Chekka, 30 July 1977, *Van Slageren, Khairallah & Hayek 12232* (K); BAHRAIN. Al Quasari road, July 1965, *Carpenter & Muharraq 20* (K); BAHRAIN. Near Barbar Temple, 23 April 1986, *Phillips 63* (K); SAUDI ARABIA. Turayf camp, 24 August 1983, *Collenette 4495* (K, E); IRAQ. 10 km north of Bibas, 20 June 1960, *Rawi, Hoshum & Nuri 29409* (K); IRAQ. Mam, Zinte Gorge, 8 June 1958, *Chapman 26096* (K); IRAQ. Msu, Sosa Kan near Tamala, 27 June 1960, *Alkatib & Tikriti 29756* (K); IRAQ. Halabja, 20 August 1953, *Guest 12930* (K); IRAQ. Darbendikhan, 14 June 1959, *Wheeler Waines W1536* (K); IRAQ. Tell Kotchek–Senonal, 22 May 1948, *Gillett 10846* (K); IRAN. Avroman and Schahu, June–July 1867, *Hausknecht s. n.* (K); IRAN. Fars, Kuh–i–Bamu, NE of Shiraz, 28 July 1966, *Archibald 2940* (K, E); IRAN. Shiraz, 01 May 1842, *Hohenacker s. n.* (K); IRAN. Shiraz, s. d., s. c. (K); IRAN. Schiras, 1 May 1842, *Kotschy 309* (E); IRAN. s. l., 2004, *Guddo s. n.* (PAL); IRAN. Kuh–i–Jariak mountain, 7 miles east of Nasjid–i–Sulaiman, s. d., *Lee 83* (K); AFGHANISTAN. s. l., s. d., *Falconer 137* (K); AFGHANISTAN. 10 km south of Shin Dand, 23 April 1964, *Furse 5488* (K); AFGHANISTAN. Near Kajakai on the road to Girinsk, 17 July 1969, *Andersen & Petersen 452* (K, E); AFGHANISTAN. Prov. Chakhansur: 8 km E Zaranj, 23 September 1976, *Breckle 4905* (E); AFGHANISTAN. Prov. Chakhansur: 2 km N Lashe, 24 September 1976, *Breckle 4928* (E); AFGHANISTAN. Prov. Fariah: 2 km W of Farahrood, 08 May 1969, *Hedge, Wendelbo & Ekberg W 7674* (E); TURKMENISTAN. Aşgabat, 20 June 1975, *Nikitin & Ivanov s. n.* (MA, E); PAKISTAN. Tando Jan, s. d., *Jafri 2406* (E); PAKISTAN. Quetta, 1957, ... (TI); INDIA. Maharashtra, Poona Distr., Sarkapathar Hill, 24 November 1964, *Venkata Reddi 101163* (K); INDIA. Bombay, s. d., *Law s. n.* (K); INDIA. Concan, s. d., *Law s. n.* (K); INDIA. Bombay, s. d., *Dalzell s. n.* (K).

1f. *Capparis spinosa* subsp. *spinosa* var. *herbacea* (Willd.) Fici, *comb. nov.*

Basionym: *C. herbacea* Willdenow (1809: 560). Lectotype (designated by Inocencio *et al.* 2006): RUSSIA, GEORGIA or AZERBAIJAN. “*Capparis herbacea*. Marschall a Bieberstein. Habitat ad Caucasum, s. d., s. c.” (lectotype B–W, folder 10034, right of sheet 2).

- C. ovata* Desf. var. *herbacea* (Willd.) Zohary (1960: 56). *Capparis sicula* subsp. *herbacea* (Willd.) Inocencio, D. Rivera, Obón & Alcaraz in Inocencio *et al.* (2006: 140).
- C. ovata* Marschall von Bieberstein (1808: 1, 1819: 361) [non Desfontaines (1798: 404)]. [*nom. illeg.*].
- C. herbacea* var. *microphylla* Ledebour (1842: 235). *C. ovata* Desfontaines var. *microphylla* (Ledeb.) Zohary (1960: 59). *C. leucophylla* var. *microphylla* (Ledeb.) Täckholm (1974: 164). Type: KAZAKHSTAN or TURKMENISTAN. “Hab. ad litt. Orient. m. Caspii. Karelin s. n.” (holotype LE).
- C. rosanowiana* B. Fedtsch. in O. Fedtschenko & B. Fedtschenko (1906: 297). *Capparis mucronifolia* subsp. *rosanowiana* (B. Fedtsch.) Inocencio, D. Rivera, Obón & Alcaraz in Inocencio *et al.* (2006: 135). Lectotype (designated by Inocencio *et al.* 2006): TAJIKISTAN. “Ost–Buchara: am östlichen Abhänge der Berge Aryktau, höher als Goranty, auf Felsen, 1900–2000’, am 3. [= 15.], April 1883, Regel s. n.” (lectotype LE). *syn. nov.*

Twigs usually white–tomentose in the upper part. Stipular thorns straight, horizontal or slightly recurved, yellowish, up to 6 mm long. Petiole 0.2–1 cm long. Leaf–blade rounded–obovate, ovate, oblong to elliptic, white–tomentose when young, 1.6–3.4 (–4.5) × 1–2.4 (–3.4) cm, shortly attenuate or cuneate at base, obtuse, rounded, acute or retuse at apex, with mucro or rigid point up to 0.9 mm long. Flower strongly zygomorphic; sepals usually pubescent outside, 1.2–2.4 cm long; petals 2–3 (–4) cm long. Fruit oblong or obovoid, (1.5–) 2.5–4.5 × (0.8–) 1.5–3 cm. (Fig. 1D).

Distribution:—Turkey, Ukraine, Georgia, Armenia, Azerbaijan, Uzbekistan, Turkmenistan, Kazakhstan, Tajikistan, Afghanistan and China (Fig. 3). Recorded also in Daghستان (Berg 1950).

Habitat:—Slopes, plains, foothills, wastelands, old walls, roadsides, bare ground; under a variety of edaphic conditions, from limestone to clay, often on substrata rich in soluble salts; c. 0–1700 m. Bobrov (1970) recorded that populations from Central Asia and Caucasus grow on serozemes of desert flatlands, rocky habitats, clay and solonchaks soils.

Phenology:—Flowering May–September.

Notes:—This variety, widespread in western and central Asia from Anatolia eastwards to China, is characterized by straight or slightly recurved stipules, mucronate or shortly cuspidate leaves and young stems and leaves covered with white–tomentose hairs. The populations from Crimea–Caucasus were firstly distinguished from typical *C. spinosa* by Marschall von Bieberstein (1808, 1819) who described a new species, *C. ovata*, differentiated by its soft–white pubescence, herbaceous stems and ovate leaves. As this binomial is a later homonym of *C. ovata* Desf., Willdenow (1809) proposed a new name, *C. herbacea*—which was widely accepted by later taxonomists. However, in Flora of the U.S.S.R. Bobrov (1970) referred this taxon to *C. spinosa*, stating that the differential characters proposed by Marschall von Bieberstein are mostly “determined by changes in the age of the species and, very significantly, by ecological factors”. The same Author recorded the species in a wide area of central Asia, where it is widespread under various ecological conditions except in the alpine habitats, sandy deserts and northernmost areas. Zohary (1960), on the other hand, reduced *C. herbacea* to a variety of *C. ovata* Desf., indicating the strongly zygomorphic corolla showing long anterior petals among its differential characters. Coode (1965), accepting Zohary’s treatment, regarded this variety as the most widespread in Turkey. Recently Inocencio *et al.* (2006) raised this variety to subspecies of *C. sicula* Veillard. Based on the species concept adopted in the present treatment, this taxon is transferred to a variety of *C. spinosa* subsp. *spinosa*.

In China, Lin (2003) and Zhang & Tucker (2008) recorded *C. spinosa* s. l. in the semiarid and arid zones of Xinjiang, Xizang and Gansu. Based on the herbarium material examined, these populations show differential characters of *C. spinosa* var. *herbacea*. In these areas, as well as in Kazakhstan, the leaf apex is often acute–acuminate with prickly mucro. According to Liu (1995), the presence of “Mediterranean elements” such as *C. spinosa* in western China testifies ancient Tethydean connections between these areas.

The populations from Tajikistan originally described as *C. rosanowiana* (*locus classicus* in the Aryk–Tau mountains in the Southern Pamir–Alai area) belong to this variety. These populations have been recorded on limestone and sands at elevations of between 600 and 1500 m (Inocencio *et al.* 2006).

As already mentioned, intermediate forms occur between *C. spinosa* var. *herbacea* and *C. spinosa* var. *canescens*, mostly in the south–eastern part of the distribution range.

Specimens examined:—TURKEY. Erzurum, Ispir, 22 June 1968, *Barclay 753* (K, E); TURKEY. Çoruh Gorge near Artvin, 24 June 1957, *Davis & Hedge D. 29982* (K); TURKEY. Çoruh, Artvin, 16 August 1957, *Davis & Hedge*

32427 (K); TURKEY. Near Ispir, June 1853, *du Pavillon s. n.* (K); TURKEY. Hakkari, Zap Gorge, 15 June 1966, *Davis 44948* (K, E); TURKEY. Between Denizli and Ias Ocađı, 13 July 1947, *Davis 13240* (E); TURKEY. Turkish Armenia, 6 miles E of Kađyman, 14 July 1964, *Watson 375* (K); TURKEY. Nordlischen Kleinasien, Amasya, s. d., *Manisadjan 752* (B); TURKEY. Zentral Anatolien, Prov. Ankara, Ostufer des Tuz Gölü, 7 October 1957, *Wagenitz & Beng 335* (B); TURKEY. Ankara nadi Kasanođlan, nadi Uamak, 3 July 1955, *Walter & Walter 803* (B); UKRAINE. Environs of Botanical Garden Nikita, 8 July 1926, *Vassilov s. n.* (K); GEORGIA. Georgia Caucasia, July–August 1834, *Hohenacker s. n.* (RO, K); GEORGIA. Near Tbilisi, 10 June 1967, *Campbell 175* (K); GEORGIA. Tiflis, 05 July 1890, *Sommier & Levier s. n.* (FI); GEORGIA. Tbilisi, Narikala, 08 June 1999, *Merello, Stone, Eristavi & Khutsishvili 2227* (E); ARMENIA, s. l., s. d., *Besser s. n.* (K); ARMENIA, s. l., s. d., *Calvert & Zohrab s. n.* (E); AZERBAIJAN, Morghak, from Parsabad to Bileh Savar, s. d., *Lamond 3097* (E); UZBEKISTAN. Samarkand, Zerafshan river Valley, 03 July 1910, *Meyer 637* (K); UZBEKISTAN. Tashkent, 05 July 1973, *Vařak s. n.* (K); UZBEKISTAN. Tashkent, 12 July 1975, *Leonard 6354* (K); TURKMENISTAN. Krasnowodsk, 25 October 1900, *Sintenis 1299* (K, E); TURKMENISTAN. Ařgabat, 22 May 1900, *s. c. 260 b* (K); KAZAKHSTAN. Tchavtogorozi Ioshnee sel. Tamerlanovski, 25 May 1965, *Priajin s. n.* (K); KAZAKHSTAN. Songarei, s. d., *Schrenk s. n.* (K); AFGHANISTAN. Bamian: Darrah Siakar, about 10 kms from Doab to the south, 21 May 1962, *Hedge & Wendelbo 3423* (E); CHINA. Xinjiang: Urumchi, 14 July 1956, *Ching 398* (PE); CHINA. Xinjiang, 13 June 1957, *Kuan 873* (PE); CHINA. s. l., 23 July 1973, *Wang & Lu 357* (PE); CHINA. Xingjang: Yarkand, 22 June 1870, *Henderson 555* (K); CHINA. Xingjang: Kashgar, s. d., *Creswell 25* (K); CHINA. Thian–Schan, 1877, *Potanin s. n.* (K); CHINA. Gobi, 1879, *Przewalski s. n.* (K).

1g. *Capparis spinosa* subsp. *spinosa* var. *atlantica* (Inocencio, D. Rivera, Obón & Alcaraz) Fici, *comb. et stat. nov.*
 Basionym: *C. atlantica* Inocencio, D. Rivera, Obón & Alcaraz in Inocencio *et al.* (2006: 131). Type: MOROCCO. Safı, 20 June 1999, *Inocencio 60026* (holotype UMH, isotypes MO, K, E, MA).

Twigs glabrous, usually purple–red. Stipular thorns recurved, up to 6 mm long. Petiole 0.3–1 cm long. Leaf–blade rounded, ovate or broadly elliptic, glabrous or glabrescent when mature, subfleshy, 1.5–3 × 1.2–2.5 cm, cordate or rounded at base, acute at apex, with mucro up to 0.5 mm long. Flower moderately zygomorphic; sepals up to c. 1.6 cm long; petals c. 1.2–2 cm long. Fruit oblong.

Distribution:—Morocco (Fig. 2).

Habitat:—Slopes, cliffs, rocky habitats; on limestone, marl, clay, metamorphic substrata; 0–2000 m.

Phenology:—Flowering May–August.

Notes:—This taxon was described by Inocencio *et al.* (2006) as a separate species, *C. atlantica*, characterized by procumbent habit, slightly decurrent stipules and acute leaf apex. This species was recorded by the same authors as the common caper in the High Atlas Mountains, where it grows on different substrata up to 2000 m elevation. It is here transferred to a variety of *C. spinosa* subsp. *spinosa*, differing from the close var. *aegyptia* mainly in its peculiar leaf tip.

Specimens examined:—MOROCCO. Greater Atlas, Siksoua, May 1871, *Hooker s. n.* (K); MOROCCO. Greater Atlas, Ouad–el–Fiek, May 1871, *Hooker s. n.* (K); MOROCCO. Djebel Oumsa, 21 July 1876, *Ibrahim s. n.* (K); MOROCCO. c. 42 km SW Beni–Mellal, Cascades d’Ouzoud, 01 July 1987, *Jury, Rejdali & Watson 8764* (MA, RNG); MOROCCO. c. 35 km S of Marrakech, Gorges de Moulay–Brahim, 02 July 1987, *Jury, Rejdali & Watson 8783* (RNG); MOROCCO. Moulay–Brahim, s. d., *Archibald 4586* (E); MOROCCO. Anti–Atlas, 18 km Tafraoute, Tizi–Mlil pass, 9 June 1974, *s. c. 468* (RNG).

2. *Capparis spinosa* subsp. *rupestris* (Sm.) Nyman (1878: 68). *C. rupestris* Sm. in Sibthorp & Smith (1809: 355). *C. spinosa* var. *rupestris* (Sm.) Viviani (1824: 26). Lectotype (designated by Inocencio *et al.* 2006): GREECE: “In Creta et Antiparo insulis, ad rupes, s.d., s.c.” (lectotype OXF).

Shrub with pendulous, unramified or few–ramified branches to 3–4 m long; young twigs glabrous, pubescent or puberulous. Stipules straight or slightly recurved, setaceous or caducous, in some cases thorny, up to 4 mm long, not decurrent at the base. Leaf orbicular, ovate, ovate–lanceolate, ovate–elliptical or obovate, glabrous or pubescent, 2–6 (–8) × 0.9–4.5 (–7), mostly coriaceous or succulent, rounded, cordate, subcordate or blunt at base, rounded, obtuse, acute or retuse at apex, with mucro vestigial, absent or up to 1 mm long; petiole 0.4–2 cm long, not sulcate. Flowers solitary, axillary, noctiflorous, slightly zygomorphic; pedicel (3.5–) 4.5–8 cm long. Sepals oblong or ovate, the posterior moderately saccate, 1.2–2.5 cm long, the others boat–shaped 1–2 cm long. Petals white, in some cases pinkish, obovate or rounded–ovate, c. 1.7–2.8 (–4) cm × 1.4–2.3 (–3) cm. Stamens numerous, with filaments (2–) 2.3–3.7 (–4.2) cm long and anthers 1.3–2.5 mm long. Gynophore c. 2.5–4.7 cm long; ovary ellipsoid, 3–6 mm long,

in some cases apiculate. Fruit ellipsoid, pyriform or obovoid, (2–) 2.2–5 cm long, mostly acute or apiculate at apex, usually splitting along one rib and with yellow–greenish pulp; seeds c. 2.2–3.6 × 2–3 mm, reddish–brown.

Distribution:—Southern Europe, Northern Africa, Anatolia.

Notes:—*C. spinosa* subsp. *rupestris*, distributed in the Mediterranean Region and Sahara, is characterized by pendulous branches, coriaceous leaves and mostly setaceous or caducous, in some cases thorny stipules. This subspecies, less variable than subsp. *spinosa*, is widespread on limestone outcrops and cliffs along the coast (Higton & Akeroyd 1991), but it is also present on volcanic rocks and other substrata, penetrating inland up to c. 2000 m elevation in northern Africa.

The woody habit, coriaceous leaves and prolonged vegetative and reproductive periods during the year support marked relationships of this subspecies with the tropical stock of the group (Fici 2001). This hypothesis was recently strengthened by the results of an investigation on Egyptian populations of *Capparis* based on RAPD fingerprinting (Moubasher *et al.* 2011), showing the affinity of representatives of this subspecies with the Sudano–Zambeziian *C. spinosa* subsp. *cartilaginea* (Decne.) Maire & Weiller (sub *C. sinaica* Veillard).

Three varieties are recognized within subsp. *rupestris*. The typical one is a Steno–Mediterranean element, var. *ovata* is distributed in northern Africa and Sicily and var. *myrtifolia* in some Saharian massifs.

Uses:—The flower buds and young fruits collected from wild plants are pickled and used as a condiment in several Mediterranean countries (Jafri 1977, Saadaoui *et al.* 2009). This subspecies is cultivated to produce capers in Spain and Italy, especially on the islands of Mallorca, Pantelleria and Salina (Fici & Gianguzzi 1997, Inocencio *et al.* 2005). Some traditional therapeutic uses in northern Africa were recorded by Rivera *et al.* (2003a). In Algeria and Morocco it is utilized for stomachache, headache, blenorhagy and as an anti–inflammatory (Maire 1933, Bellakhdar 1997), while in Lybia tea prepared with the plant is a remedy for stomach diseases (El–Gadi & Bshana 1986). In southern Europe var. *rupestris* is also used as an ornamental plant in rock gardens, where it is appreciated for its pendulous habit, glossy leaves and showy flowers.

Key to the varieties of *C. spinosa* subsp. *rupestris*

- 1 Leaf orbicular, ovate or obovate, rounded, blunt or retuse at apex; stipules up to 2.5 mm long, mostly setaceous or caducous; Mediterranean Region..... var. *rupestris*
- Leaf ovate, ovate-elliptical or ovate-lanceolate, acute at apex; stipules up to 4 mm long, persisting, rarely caducous..... 2
- 2 Young twigs glabrous or glabrescent; leaf ovate-lanceolate, 2.3–4 × 0.9–1.9 cm, with stiff mucro; Algeria, Libya, Chad..... var. *myrtifolia*
- Young twigs more or less pubescent; leaf ovate or ovate-elliptical, 2–5.5 × 1.7–4.5 cm, with soft mucro; Morocco, Algeria, Tunisia, Libya, Italy..... var. *ovata*

2a. *Capparis spinosa* subsp. *rupestris* var. *rupestris*.

C. inermis Turra (1780: 65) [non Forsskål (1775: 100)]. [*nom. illeg.*].

C. spinosa subsp. *inermis* A. Bolòs & O. Bolòs (1961: 88). [*nom. illeg.*].

C. orientalis Veill. in Duhamel (1801: 142). *Capparis spinosa* subsp. *orientalis* (Veill.) Jafri (1977: 3). Lectotype (designated by Inocencio *et al.* 2006): “The image in J. Bauhin, J. Cherler & D. Chabrey, Hist. Plant. Vol. II: 63. 1651”.

Twigs glabrous or glabrescent. Stipules setaceous or caducous, straight or slightly recurved, rarely thorny, up to 2.5 mm long. Petiole 0.4–2 cm long. Leaf–blade orbicular or ovate, sometimes obovate, coriaceous or succulent, usually glabrous, (2.5–) 3–6 (–8) × (1.7–) 2–4.5 (–7) cm, rounded, cordate or subcordate at base, rounded, blunt or retuse at apex with mucro vestigial or absent. Posterior sepal 1.3–2.4 cm long, the others 1–2 cm long; petals (1.8–) 2–3 (–4) cm long. Fruit oblong–ellipsoid or pyriform, (2–) 3–5 cm long. (Fig. 5A).

Distribution:—Spain, France, Italy, Malta, Slovenia, Croatia, Albania, Greece, Turkey, Egypt, Libya and Tunisia (Fig. 6). Recorded in Algeria by Inocencio *et al.* (2006). According to Zohary (1960), old records from Israel are erroneous.

Habitat:—Cliffs, rocky outcrops and slopes, old walls; on limestone, lava, gypsum, and marl. 0–950 m.

Phenology:—Flowering March–September.

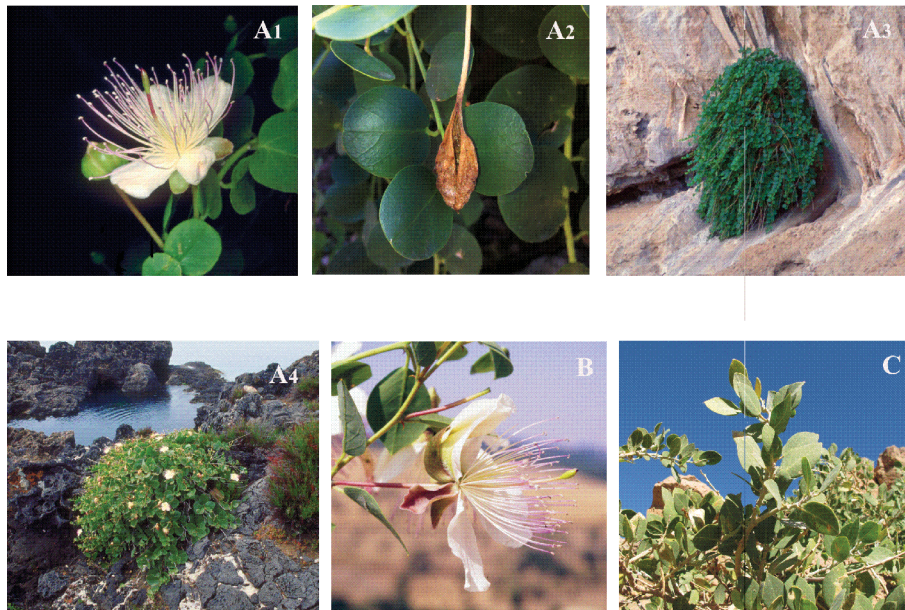


FIGURE 5. *Capparis spinosa* subsp. *rupestris*. **A.** Var. *rupestris*: A1. Flower. A2. Ripe fruit. A3, A4. Habit. **B.** Var. *ovata*: Flower. **C.** Var. *myrtifolia*: Branches. (Photo A1 by G. Campo; B by S. L. Jury; C by S. Cambria).

Notes:—*C. spinosa* var. *rupestris*, showing Steno-Mediterranean distribution, is widespread in coastal rocky habitats and on old walls in southern Europe, where it is characteristic of a chasmo-nitrophilous vegetation referred to the association *Capparidetum rupestris* Bolòs & Molinier 1958 (Brullo *et al.* 2001). In northern Africa it is common along the coasts of Libya and in central and north-eastern Tunisia (Maire 1965), while in Asia it is known only in western Anatolia, in Marmaris and Antalya districts (Coode 1965). This variety is characterized by its pendulous branches and broad, sometimes succulent, leaves. Leaves and upper parts of twigs are usually shed during winter, but individuals with evergreen branches are present in central and southern Mediterranean in areas protected from northern winds. As regards habit, pendulous, unramified or few-ramified branches up to 3–4 m long are produced from a swollen xylopodium (Fici & Gianguzzi 1997). In most cases stipules are setaceous or caducous at a young stage, but in some areas individuals with thorny, straight or slightly recurved stipules, are present. Such thorny forms are rare in the Italian peninsula, becoming more frequent in northern regions where *C. spinosa* var. *rupestris* is recorded mostly in urban areas.

Specimens examined:—SPAIN. Catalogne: Horta pres Barcelona, 21 July 1913, *Sennen 1587* (MA); SPAIN. Balears: Mahon, Barranco San Juan, June 1899, *Pons & Gueran s. n.* (MA); SPAIN. Balears: Majorque, pres le port de Soller, 14 June 1869, *Bourgeau 2729* (MA, K); SPAIN. Balears: Menorca, Ciudadela, 10 June 1997, *Álvaro & Medina LMP687* (MA); SPAIN. Balears: Ibiza, Colina del Castillo, 25 September 1951, *s. c. 406* (MA); SPAIN. Andalucia: Córdoba, s. d., *Rodríguez s. n.* (MA); SPAIN. Valencia: Náquera, May 1978, *Mansanet s. n.* (MA); SPAIN. Valencia: Corbera de Alcira, June 1945, *Borja s. n.* (MA); SPAIN. Castellón: Cervera del Maestrat, 08 September 2000, *Azán & Tohá 7.1.02a* (MA); SPAIN. Lleida: Ager, 04 August 1985, *Pedrol 814* (MA); SPAIN. Cataluña: S. Felin de Llobregat, June 1914, *Caballero s. n.* (MA); SPAIN. Gerona, 22 July 1876, *Vayreda s. n.* (FI); FRANCE. Var: Fréjus, July 1899, *Bertrand s. n.* (FI); FRANCE. Alpes-Maritimes: Villefranche pres Nice, January 1862, *Bourgeau s. n.* (FI); ITALY. Lombardia: Salò, 1862, *Malinverni s. n.* (FI); ITALY. Lombardia: Bergamo, s. d., *s. c. s. n.* (K); ITALY. Lombardia, ad Benacum, s. d., *s. c. s. n.* (K); ITALY. Piemonte: Torino, Madonna del Pilone, 28 August 1896, *Ferrari s. n.* (RO); ITALY. Piemonte: Ivrea, 28 August 1906, *Vaccari s. n.* (FI); ITALY. Veneto: tra Torbole e Marcesine, Lago di Garda, 1933–34, *Comboni s. n.* (FI); ITALY. Veneto: Benaco, July 1889, *Porta s. n.* (FI); ITALY. Veneto: Verona, September 1896, *Vaccari s. n.* (FI); ITALY. Friuli: Gradisca, 16 June 1898, *s. c. s. n.* (B); ITALY. Liguria: Monti di Borzoli, 19 July 1907, *Cannede s. n.* (RO); ITALY. Liguria: Genova, July 1892, *Bastreri s. n.* (FI); ITALY. Emilia-Romagna: Madonna di Fiorano, colli Modenesi, 29 July 1883, *Fiori s. n.* (FI); ITALY. Emilia-Romagna: Bologna, Eremo presso Casalecchio, August 1884, *Vizzini s. n.* (RO); ITALY. Toscana: Firenze, 1 May 1889, *Martelli s. n.* (P); ITALY. Toscana: Monte Argentario, Porto Ercole, 30 May 1992, *Baldini s. n.* (FI); ITALY. Toscana: Porto Santo Stefano, 19 July 1911, *Bianca s. n.* (FI); ITALY. Toscana: Monte Oliveto Maggiore presso Chiusura, 05 July 1946, *Corradi & Contardo s. n.* (FI); ITALY. Lazio: Roma, 10 June 1952, *Cacciato s. n.* (B); ITALY. Umbria: Spoleto,

03 October 1994, *Grampini s. n.* (RO); ITALY. Umbria: Isola Bisentina, Lago di Bolsena, s. d., *Mori s. n.* (FI); ITALY. Umbria: Montalera, Lago Trasimeno, 29 July 1881, *s. c. s. n.* (FI); ITALY. Campania: S. Maria di Vietri, 22 May 1893, *Martelli s. n.* (MA); ITALY. Campania: Ischia, 04 August 1875, *Comes s. n.* (FI); ITALY. Campania: Pozzuoli, 18 August 1891, *Martelli s. n.* (FI); ITALY. Basilicata: Matera, Gravina, 08 September 1888, *Corazza s. n.* (RO); ITALY. Puglia: S. Nicola di Tremiti, August 1909, *Mucciarelli s. n.* (RO); ITALY. Puglia: Gargano, 26 May 1968, *Moggi s. n.* (FI); ITALY. Puglia: Gravina di Puglia, 12 June 1968, *Nardi & Bavazzano s. n.* (FI); ITALY. Puglia: Viesti, 27 May 1893, *Martelli s. n.* (FI); ITALY. Calabria: Pizzo, August 1864, *Pasquale s. n.* (FI); ITALY. Calabria: Copanello, 11 August 1883, *Fiori s. n.* (FI); ITALY. Calabria: Scilla, 25 May 1877, *Arcangeli s. n.* (FI); ITALY. Sardegna: Cagliari, s. d., *Muller s. n.* (K); ITALY. Sardegna: Sassari, Rizzeddu, 15 June 1980, *Macchiati s. n.* (RO); ITALY. Sicilia: Monte Cofano, 29 May 2000, *Aedo 5478* (MA); ITALY. Sicilia: Rocca d'Entella, 24 July 1996, *Certa, Iardi & Gianguzzi s. n.* (MA); ITALY. Sicilia: Lipari, October 1858, *Mandralisca s. n.* (FI); ITALY. Sicilia: Isnello, 08 June 1983, *Arrigoni, Moggi, Ricceri & Rizzotto s. n.* (FI); ITALY. Sicilia: Messina, 10 September 1868, *Parlatore s. n.* (FI); ITALY. Sicilia: Misterbianco, 25 May 1942, *s. c. s. n.* (FI); ITALY. Sicilia: Taormina, 20 May 1936, *Fielder 12912* (B); ITALY. Sicilia: Caltanissetta, May 1932, *Cacciato s. n.* (RO); ITALY. Sicilia: Favignana, 14 June 1983, *Sag 1623* (P); MALTA. Ghozo, 15 April 1906, *Sommier s. n.* (FI); MALTA. Comino, 7 May 1907, *Sommier s. n.* (FI); MALTA. La Valette, 2 July 1915, *Gandoger s. n.* (K); SLOVENIA. Strugnano, July 1892, *Marchesetti s. n.* (FI); CROATIA. Dalmatia: Is. Pelagosa, March 1882, *Marchesetti s. n.* (FI); CROATIA. Dalmatia: s.l., s. d., *Petter s. n.* (K); CROATIA. Dalmatia: Makarska, June 1932, *Gilliat-Smith 3197* (K); CROATIA. Dubrovnik, May 1907, *Adamović s. n.* (K); CROATIA. By the harbour at Dubrovnik, July 1984, *Hanson s. n.* (MA); ALBANIA. Sarandë, 15 July 1933, *Alston & Sandwith 2248* (K); GREECE. Dodekanes: Insel Sokastro, s. d., *Raus 8382* (MA); GREECE. N. of Port Heli, 10 May 1980, *Lewis 642* (K); GREECE. Prope Naupliam, s. d., *Berger s. n.* (K); GREECE. Ad Phaleraeum, July 1848, *Heldreich s. n.* (K); GREECE. Sciroman, July 1930, *Atchley 176* (K); GREECE. Aegean Islands, Sifno, Artemon, 20 August 1963, *Royal Liberty School 28* (K); GREECE. Crete: Island of Elaphonisi, 11 May 1967, *Barclay 173* (K); GREECE. Crete: Penins. Akrotiri, Mons Koriakes, 25 May 1942, *Rechinger 13302* (K); GREECE. Crete, Kharia, 44 km W of town, 13 May 1977, *Barclay 3638* (K); GREECE. Island of Siphanto, August 1841, *s.c. s. n.* (K); TURKEY. Mugla Province: Marmaris District, Datca Knidas, 18 July 1960, *Khan, Prance & Ratcliffe 116* (K); EGYPT. Marmarica: Wady Battuma, Sallum, 12 April 1932, *Shabetai 4841* (K); EGYPT. Sallum, 20 June 1961, *Batanouny s. n.* (K); LIBYA. Kouf National Park, Wadi Kouf Gorge, 23 June 1980, *J. H. H. L.26* (K); LIBYA. Tripolitania, Jebelif, near Garian, 11 June 1954, *Neal-Smith H 1195* (K); LIBYA. Tripolitania, Garian, 07 July 1962, *Keith 1000* (K); LIBYA. Cirenaica, Chaulan, 20 April 1934, *Pampanini & Pichi-Sermolli 3260* (K); LIBYA. Cyrenaica, Jbel Akhdar, about 10 km W of Susa, Brak Lotha, 2 May 2009, *Jury & Essokne RE66a* (RNG); TUNISIA. Dahmani, 2006, *Saadaoui IV 9* (PAL); TUNISIA. Haouaria, 2006, *Saadaoui III 15* (PAL); TUNISIA. Kairouan, 2006, *Saadaoui I n* (PAL).

2b. *Capparis spinosa* subsp. *rupestris* var. *ovata* (Desf.) Fici, *comb. nov.*

Basionym: *C. ovata* Desfontaines (1798: 404) [non Marschall von Bieberstein (1808: 1, 1819: 361)]. Lectotype (designated by Inocencio *et al.* 2006): ALGERIA. "Habitat in fissuris rupium prope Oran, s. c. 948" (lectotype P).

C. spinosa var. *ovata* (Desf.) Batt. in Battandier & Trabut (1888: 82).

C. sicula var. *kruegeriana* Pampanini (1926: 459). *C. spinosa* var. *rupestris* forma *kruegeriana* (Pamp.) Pampanini (1931: 234). *C. spinosa* subsp. *orientalis* var. *kruegeriana* (Pamp.) Jafri in Ali & Jafri (1977: 4). Type: LIBYA. Marmarica: Porto Bardia, 20 July 1926, *Krüger s. n.* (holotype FI).

Young twigs more or less pubescent. Stipules straight or slightly recurved, sometimes caducous, up to 3–3.5 mm long, not decurrent. Petiole 0.5–1.1 cm long. Leaf-blade ovate or ovate–elliptical, pubescent or glabrescent when mature, subcoriaceous, 2–5.5 × 1.7–4.5 cm, subcordate, rounded, blunt or shortly attenuate at base, acute at apex, with mucro up to 0.7 mm long. Posterior sepal 1.5–1.9 cm long, the others 1.4–1.7 cm long; petals 1.9–2.8 cm long. Fruit ellipsoid or obovate, 2.2–4 cm long. (Fig. 5B).

Distribution:—Morocco, Algeria, Tunisia, Libya, Italy (Fig. 6).

Habitat:—Rocky slopes, cliffs, walls; limestone and siliceous substrata. 0–1900 m.

Phenology:—Flowering March–September

Notes:—Desfontaines (1798) described *C. ovata* on material collected on cliffs near Oran, Algeria. The type of this species (P) shows pubescent twigs, young leaves and flower buds, stipules straight or lacking and leaves ovate, subcordate at base and acute at apex. These characters fall within the variability of *C. spinosa* subsp. *rupestris*, justifying the institution of the new combination proposed here.

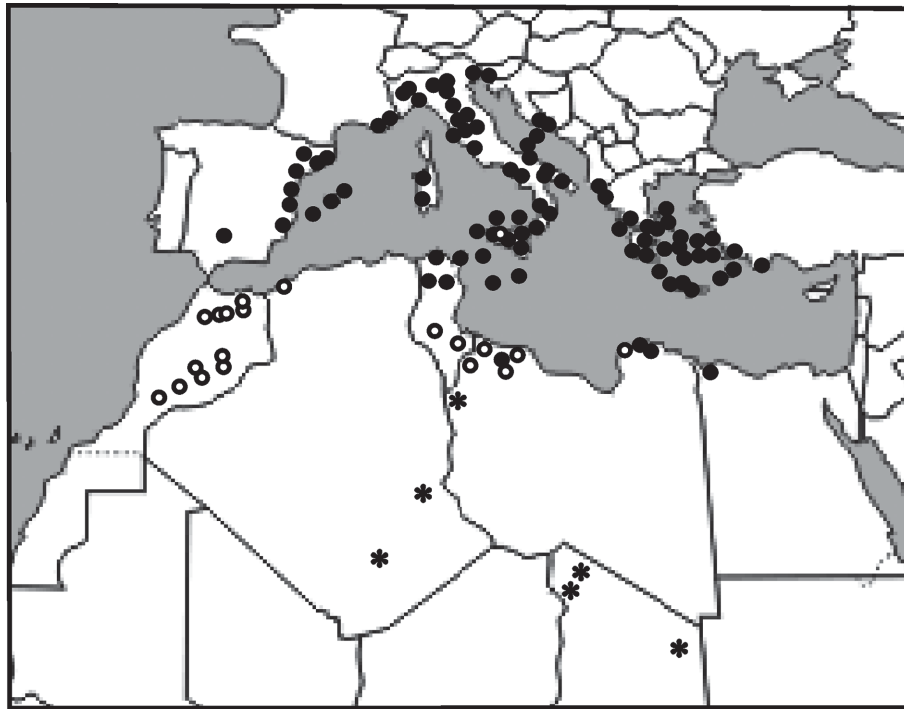


FIGURE 6. Distribution of varieties of *Capparis spinosa* subsp. *rupestris*: var. *rupestris* (●); var. *ovata* (○); var. *myrtifolia* (*).

Zohary (1960) pointed out that the application of the name *C. ovata* has been mostly confused in the herbaria and nomenclature. The main reason for this misinterpretation is probably due to the poor original description of the species—“*Folia ovata, acutiuscula*”—provided in Desfontaines’ protologue. In *Flore de l’Afrique du Nord*, Maire (1965) reported this taxon – sub *C. spinosa* subsp. *spinosa* var. *ovata* – in Algeria and Morocco, differentiating it from var. *rupestris* by the ovate, obtusiuscule or ogivale leaves and the more or less marked pubescence. However, populations showing similar characters are widespread in other countries of northern Africa, i. e. Tunisia and Libya. It should be underlined that material from Libya with the same features was studied by Pampanini (1926, 1931), who firstly described it as a variety of *C. sicula*, later transferring it to a form of *C. spinosa* var. *rupestris*. This taxon was subsequently transferred by Jafri (1977) to a variety of *C. spinosa* subsp. *orientalis*.

Recently, Inocencio *et al.* (2006) treated *C. ovata* as a separate species split into two subspecies, recording the typical one in Algeria, Libya, Morocco and Tunisia. For the same authors this taxon is characterized by pendulous branches, ovate, subcoriaceous leaves, acute at apex, and stipules antrorse, sometimes spreading, very small or early falling. In the southern districts of Kebili and Ghomrassen in Tunisia, Saadaoui *et al.* (2009) recorded populations of *C. spinosa* subsp. *rupestris* showing more or less pronounced pubescence, relative thorn development and foliage persistence, all characters regarded as adaptive to arid environments. *C. spinosa* var. *ovata* has also been sporadically observed in Sicily, where var. *rupestris* is more common.

C. fontanesii DC. is illegitimate under Art. 52.1 and 52.2, as it is a superfluous name for *C. ovata* Desfontaines, which Candolle (1824) cited as a synonym, explicitly including the type of the latter name.

Specimens examined:—MOROCCO. 2 km below Msemrir, above the Gorges du Dadès, 10 July 1997, *Jury 17776* (RNG); MOROCCO. Fès – Taza road, W of Col de Touahar, 24 April 1995, *Jury 16777 & Lafkih, El Haila, Wilson* (RNG); MOROCCO. South-western Anti-Atlas, c. 27 km W of Tata, 22 March 1994, *Jury 14453* (RNG); MOROCCO. 25 km from Taza, just south of Sidi-Abdallah-Des-Rhiata, 22 June 1987, *Jury, Rejdali & Watson 8602* (MA, RNG); MOROCCO. Imzourène, c. 6 km SW of Midar, 05 November 1994, *Jury 15602* (RNG); MOROCCO. Fès, 09 June 1995, *Mateos 6653/95* (RNG); MOROCCO. High Atlas: N of Er-Rachidia, Gorge du Ziz, 12 July 1997, *Jury 17819* (RNG); MOROCCO. High Atlas: Aït Lobbès, valley of Ziz, 16 July 1985, *Damblon 85/145* (RNG); MOROCCO. High Atlas: Amesker, N of El Kelâa-des-Mgouna, 4 July 1997, *Muñoz Garmendia 5385MG* (MA, RNG); MOROCCO. Anti-Atlas: Prov. Ouarzazate, 1 km S of Bou Azzer, 16 April 1993, *Brooks, Dunn, Edmonson & Leblanc E.5349* (RNG); MOROCCO. Taza, Tnant, Djebel Menguer, 1 July 1993, *Diaz, Etlaftski & Valdés BV1281/93* (RNG); MOROCCO. Tinghir, 1 May 1936, *Garnett 9223/8* (BM); ALGERIA. Oran, April 1839, *Bové s. n.* (K); ALGERIA. *s. l.*, 23 April 1938, *Faure s. n.* (E); ALGERIA. 15 June 1896, *Reverchon s. n.* (E); LIBYA. Tripolitania:

Tarhuna, 14 August 1962, *Keith 1038* (K); LIBYA. Tripolitania: Bu Ghelan, 28 August 1962, *Keith 1012* (K); LIBYA. Cyrenaica: Guba livestock ranch, 20 May 1958, *Park 554* (K); LIBYA. Gebel Nefoussa, below Giado, 17 March 1970, *Davis 49678* (K, RNG); LIBYA. Coefia, N. of Benghazi, 03 April 1970, *Davis 50477* (K, RNG); TUNISIA. s. l., 30 May 1884, *Letourneux s. n.* (P); TUNISIA. Kebili, 2006, *Saadaoui s. n.* (PAL); TUNISIA. Ghomrassen, 2006, *Saadaoui s. n.* (PAL); ITALY. Sicily: Barcarello, 5 June 2011, *Fici s. n.* (PAL); ITALY. Sicily: Palermo all'Arenella, 10 June 2012, *Fici s. n.* (PAL).

2c. *Capparis spinosa* subsp. *rupestris* var. *myrtifolia* (Inocencio, D. Rivera, Obón & Alcaraz) Fici, *comb. et stat. nov.*

Basionym: *C. ovata* Desfontaines subsp. *myrtifolia* Inocencio, D. Rivera, Obón & Alcaraz in Inocencio *et al.* (2006: 137). Type: CHAD. "Habitat in fissuris rupium Enneri Gousa, Tibesti, 3000", 15 March 1953, *Guichard KG/TIB/40*^a (holotype P).

Twigs glabrous or glabrescent. Stipules slightly recurved or spreading, up to 4 mm long, not decurrent. Petiole 0.4–1 cm long. Leaf-blade narrowly ovate or ovate-lanceolate, coriaceous or subcoriaceous, glabrous or puberulous when mature, 2.3–4 × 0.9–1.9 cm, rounded at base, acute at apex, with mucro up to 1 mm, somewhat prickly. Posterior sepal 1.2–1.5 cm long, the others 1–1.4 cm long; petals 1.7–2.2 cm long. Fruit obovate. (Fig. 5C).

Distribution:—Algeria, Chad, Libya (Fig. 6).

Habitat:—Cliffs and rocky slopes; on sandstone and volcanic substrata. 760–2000 m.

Phenology:—Flowering December – April.

Notes:—This variety, known from scanty collections from the central Sahara mountains (Tibesti, Ennedi, Hoggar, Tassili), shows pendulous habit and ecological adaptations to rocky habitats. Leaves are coriaceous or subcoriaceous, while stipules are persisting and thorny, recurved–retrorse or spreading. The flowers usually have white petals, in some cases turning to marked pink, as in *Hinchinsbrookt 56*. *C. spinosa* var. *myrtifolia* is likely the result of differentiation processes due to the isolation of subsp. *rupestris* populations in these mountains ranges, following the progressive desiccation of Sahara. Davis (1951) underlined the role of rocky outcrops as refugia of ancient floristic elements, while Danin (1978) stated that in desert areas these habitats, if compared to others, withstand relatively wet conditions.

This taxon has been described by Inocencio *et al.* (2006) as a subspecies of *C. ovata*, characterized by ovate-lanceolate mature leaves and retrorse stipules. Previously Maire (1965) gave a different interpretation, referring the populations of the Sahara mountains to a form of *C. spinosa* subsp. *spinosa* var. *canescens* characterized by thickened leaves (f. *coriacea* Cosson).

Material collected in rocky habitats east of Rhadamès (*Largeau 41*), belongs to this variety. This specimen was erroneously referred to *C. galeata* Fresenius [= *C. spinosa* subsp. *cartilaginea* (Decne.) Maire & Weiller] by Durand & Barratte (1910); records of the latter taxon in Libya and other areas of northern Africa appear doubtful and are probably due to confusion with *C. spinosa* subsp. *rupestris* (Jafri 1977).

Specimens examined:—ALGERIA. Darmouilly, 28 miles W of Tamanrasset, 8 March 1930, *Chipp 28* (P); LIBYA. À l'est de Rhadamès, 15 February 1875, *Largeau 41* (P); CHAD. Aouzi, Tibesti, January 1931, *Dalloni s. n.* (P); CHAD. Enneri Bardagué, March 1931, *Dalloni s. n.* (P); CHAD. Enneri au NE du Timi, s. d., *Sérole 57* (P); CHAD. Enneri Arr., s. d., *Sérole 30* (P); CHAD. Tibesti, Auzou, 25 March 1966, *Hinchinsbrookt 56* (K).

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