Archeobotany of capers (*Capparis*) (Capparaceae)

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**Abstract.** The origins of capers, their use and cultivation are discussed. Capers seeds and charcoal are often recovered from archaeological sites of the Mediterranean and West Asia. These are referred to as *C. spinosa* L. This is mostly a group of cultivars restricted to localities surrounding the Western Mediterranean and some places in the Eastern Mediterranean. Identification of the findings is discussed in terms of seed morphology, present distribution and ancient uses of *C. aegyptia* Lam., *C. sicula* Veill., *C. cartilaginea* Decne, *C. orientalis* Veill., *C. decidua* (Forssk.) Edgew. and other species. Citations of *Capparis* in early Rabinic, Mesopotamian and Greco-Roman texts are presented.

**Keywords:** Plant domestication – Foods – Mediterranean – Medicinal plants – Near East – Spices – Written evidence

**Introduction**

Commercial capers are the immature flower buds of *Capparis* spp. that have been pickled in vinegar or preserved in granular salt. Semi-mature fruits and young shoots with small leaves may also be pickled for use as a condiment. The use of capers can be traced to ancient civilisations. Currently it is centred around the Mediterranean and based on the exploitation of wild *C. sicula* populations and cultivation of *C. spinosa* and *C. orientalis* (Inocencio et al. 2000, 2002). Capers seeds and charcoal are often recovered from archaeological contexts of the Mediterranean and West Asia. These are referred to as *C. spinosa* or *Capparis* sp. (see below).

The present paper grew out of the taxonomic revision of *Capparis* subgenus *Capparis* and subsequent studies on its traditional and present commercial uses (Inocencio 2001; Inocencio et al. 2000, 2002). This led us to conclude that *C. spinosa* is a spontaneous hybrid between *C. orientalis* and *C. sicula*, both originating in wild populations of the parent species and in plantations of *C. orientalis*. Therefore, although most *Capparis* findings in archaeological contexts of the Mediterranean and the Near East are referred to as *Capparis spinosa*, this species did not occur there. Instead, other species, wild or semi-domesticated, such as *C. aegyptia*, *C. orientalis* and *C. sicula*, the most common in the Mediterranean and Near East, have been collected for consumption or have even been cultivated locally. In this paper therefore the identification possibilities based on measurements and seed morphology of present day species are discussed. Further, a compilation of the archaeological finds in the Near East and the Mediterranean is presented and revised proposals for the archaeological determinations are made.

All *Capparis* species in the area considered here belong to *Capparis* subgenus *Capparis* except *C. decidua*. The species of subgenus *Capparis* growing in the Pacific, Australia, Madagascar, and SW Africa (*C. cordifolia*, *C. hereroensis*, *C. antinous saro*, *C. nummularia*) are not included. Neither are the species considered that belong to other subgenera occurring in Tropical Africa, Pakistan, India and other tropical areas of the Old World.

**Materials and methods**

Archaeological and recent plant material from the different species of *Capparis* from Europe, the Mediterranean region and West Asia were compared.

Special collection trips were conducted in North Africa, West Asia and the Mediterranean to obtain fresh material for study. Voucher specimens were deposited in the herbarium of Murcia University.

The herbaria and libraries of the following institutions were consulted, codes are as in Holmgren et al. (1990): (United States) JEPS, RSA; (Great Britain) OXF - Oxford, BM - Natural History Museum, K - Kew, E - Edinburgh; (Spain) MA - Real Jardín Botánico, MUB - Murcia; (France) P - Muséum National d’Histoire Naturelle. Specimens on loan were received from (United States) US - Smithsonian, BISH - Bishop Museum; (Great Britain) RNG - Reading University; (Denmark) C - Copenhagen; (Switzerland) G - Conservatoire et Jardin Botanique Geneva; (Belgium) BR - Bruxelles; (France) MARSJ - Université de Marseille; (Turkey) HUB; (Israel) HUJ - Hebrew University Jerusalem. Seeds from herbarium specimens were measured and studied at first hand (using an Olympus SZ binocular optical
microscope and a Jeol 6.100 SEM) as was archaeological material from the Iberian Peninsula (sites of Cueva Sagrada, Cueva Perneras, El Rincón de Almendricos) and Syria (site of Quaara-Quaza).

A bibliographical review was carried out in order to record the citations of Capparis from archaeological sites in Europe, the Mediterranean and West Asia. For authors of the mentioned species see Appendix 1.

Results

The forms and dimensions of Capparis seeds and fruits

Capers are represented in archaeological levels in form of carbonised seeds and, rarely, flower buds and fruits. Also occasional findings of dried seeds are known. Reports of Capparis charcoal are probably linked to the use of the stems of Capparis decidua as this quick-burning wood is used as fuel and occasionally for timber; it is hard, heavy, even-grained and tough and is used for making tool-handles, boat-knees etc. as it is resistant to termite attack. More rarely the branches of C. zoharyi, C. parviflora and C. cartilaginea are used as fuel. Most Capparis species of Western Asia and the Mediterranean are geophytes, the annual growth is not lignified and thus it is a poor, although locally abundant, fuel.

Capers plants are small trees or shrubs. The leaves are simple, entire, alternate, with well developed petioles. The stipules are spiny, of epidermal origin, not leafy, developed at the base of the petioles and are lacking or early falling in several species.

The flowers have a triangular nectary placed in the floral disk. A gynophore is present as an elongated structure produced by the proliferation of the floral axis. The ovary is ellipsoidal and unilocular placed at the end of the gynophore (Fig. 1). The fruit is a berry on a more or less vigorous stalk, obovate-oblong, ovoid to spherical or ellipsoidal, green in colour with marked longitudinal nerves through which it splits. Seeds range from one to numerous, are usually dark brown upon ripening and immersed in a reddish or yellow pulp (Fig. 2). The seeds are globose, obovate or elliptical in outline, in side-view tapering from the top to the base (more or less wedge-shaped). The prominent curved radicule (Fig. 3) is a relevant feature for C. zoharyi, C. sicula, C. parviflora but it does not occur in others species such as C. mucronifolia and C. cartilaginea (Fig. 4). Sometimes only the "inner seed", reminiscent of chenopodiaceous seeds, has been preserved in archaeological contexts.

Seed coat morphology is characteristic but extremely homogeneous among species and therefore cannot be used as a taxonomic marker. The seed shows a "bee-hive" pattern of small foveolae (finely pitted) when the external coat (the outer cell layer of the testa) is missing (Fig. 3). This external coat presents a uniformly rough surface with very small protuberances and sometimes remains of the pulp (Fig. 5). Together both coats (= testa) are 0.1 mm thick and relatively fragile. Often some of the seeds are almost empty, especially in unripe fruits, but sometimes in those that are ripe, and therefore becoming extremely fragile (Fig. 2).

Seed dimensions are relatively uniform among species but still different enough to tentatively distinguish three groups (Table 1, Fig. 6)

![Fig. 1. Longitudinal section of Capparis sicula flower bud showing triangular nectary, stamens, gynophore, ovary, petals and sepal. The buds from this and other species are often consumed and carbonised remains are reported from Bronze Age Tell es-Sweyhat](image1)

![Fig. 2. Transverse section of Capparis sicula immature fruit showing the seeds immersed in the white-yellowish pulp. At this stage the fruits are sometimes consumed brined. Also reported from Bronze Age Tell es-Sweyhat](image2)