



RESEARCH ARTICLE

IMPACT OF DIFFERENT GEOGRAPHICAL LOCATIONS ON MORPHOLOGICAL CHARACTERISTICS OF CAPPARIS SPINOSA L (LIBYA, TUNISIA AND MOROCCO)

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ABSTRACT

The caper is of the Capparidaceae family which has been found naturally in the Mediterranean Sea basin. The Capar is shrub that has economic importance and many qualities with many uses. The objective of this study was the evaluation of morphological diversity of (*Capparis spinosa* L.) among the three countries from Maghreb. The results showed there different level of morphological variation among the caper samples in study sites. In Libya and Morocco were the morphology characteristics of leaves (length and width) nearly similar, however the highest one of leaf length and leaf width were 43 mm and 37mm respectively had been in Tunisia. On the other hand, in this study showed a perfect different in seeds parameters in Morocco with comparative in other countries which the length was 8.65mm, width was 7.97mm and weight of 1000seeds was 137g. The results indicated the existence different levels of morphological variation in the *Capparis spinosa* L samples from Mansura in Libya, Ghomrassen in Tunisia and FEZ in Morocco. the morphological characteristics have been impacted by some factors such as geography of location, climate, soil characteristic and molecular studies. we want to study some of them in these study sites in other time.

INTRODUCTION

Caper is the common name of the genus *Capparis*, family of *Capparaceae*. Its origin is the tropical regions and includes more than 250 species in the entire world (Jacobs, 1965). Caper, a perennial, winter-deciduous shrub native to Mediterranean region, grows widely at various regions of the world. Its immature flower buds, semi-mature fruits and young tender shoots with small leaves are pickled for pharmacological and cosmetic fields but especially are used as a condiment (Riviera *et al.*, 2003). *Capparis spinosa* is the most important species. It is one of the most commonly found aromatics in the Mediterranean Sea basin (Armanino *et al.*, 2002). Before its commercialization, the fresh aerial parts, including the fruit and the flower buds (capers) are stored in vinegar or brined and eaten pickled. Previous chemical studies on *C. spinosa* have brought attention to the richness of different parts of this plant with beneficial compounds (Armanino *et al.*, 2002). As a spontaneous plant, caper has a large natural distribution in the Mediterranean Sea basin; it grows from the Atlantic coasts of the Canary Islands and Morocco to the Black Sea and to the Crimea and Armenia, and eastward to the Caspian Sea and into Iran (Romeo *et al.*, 2007).

This reflects the adaptation of this plant with varied soil and climatic conditions as drought, high temperature and salinity (Levizou, 2004; Rhizopoulou & Psaras, 2003). This species is an interesting crop with an economic importance in the Mediterranean region over the last years (Romeo *et al.*, 2007). Spain, Morocco and Italy were the main producer countries (Levizou *et al.*, 2004). The botanical classification of the genus *Capparis* is based on morphological characters such as leaf shape, flowers, spines etc. 3-24. This traditional classification based on the observation of both quantitative and qualitative macro-morphological characters could have a wide margin of error due to the effect of environmental conditions on the phenotypic characters 3. In previous morphological studies, we find that we have eight varieties of *Capparis* occurring in Morocco and particularly those growing in Northern Morocco (Regions Fes, My Idriss, Taounate). The results of this characterization show the existence of three species: *Capparis cartilaginea* Decne, *Capparis ovata* Desf and *Capparis spinosa* L. For the last two species, *C. ovata* Desf is represented by three varieties: *C. ovata* Desf. var. *sicula* (Duham) Zoh, *C. ovata* Desf. var. *herbacea* (Willd) Zoh and *C. ovata* Desf. var. *ovata*. *Capparis spinosa* L. is represented by four varieties: *C. spinosa* L.var. *intermis* Turra, *C. spinosa* L.var. *spinosa*, *C. spinosa* L.var. *aegyptia* and *C. spinosa* L.var. *deserti* Zoh. 24. In Tunisia, caper is characterized by a wide geographical distribution (Barbera, 1991; Saadaoui, 2007). Indeed, a morphological study of vegetative and reproductive apparatus, show that in Tunisia there is only one species with two

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different subspecies: *C. spinosa* subsp. *spinosa* (thorny caper) and *C. spinosa* subsp. *rupestris* (inerm caper) (Saadaoui *et al.*, 2007). Libya has one species of Capparaceae which is *Capparis spinosa* L (El-Darier & El-Mogaspi 2009).

MATERIALS AND METHODS

Study Sites. Our project has been conducted in Mansura town which located in the Jebel el-Akhdar in north-eastern Libya. In Tunisia, Ghomrassen is a city of southeast Tunisia located 26 km (16 mi) from Tataouine and 40 km (25 mi) from Medenine (Saadaoui *et al.*, 2011). And FEZ is a city in northern inland Morocco and It is the third largest city in Morocco, with a population of 1.15 million according to the 2014 census (El-amri *et al.*, 2019). Their geographical coordinates are listed in Table (1).

Table 1. Geographical coordinates of locations.

Locations	Latitude (N)	Longitude (E)	Longitude (W)	Altitude (m)
Mansura (Libya)	32° 50' 0"	21° 51' 0"		400
Ghomrassen (Tunisia)	33° 3' 33"	10° 20' 24"		326
FEZ (Morocco)	34° 2' 36"		5° 0' 12"	414

Morphological parameters analyzed. The analysis of the quantitative characters was based on five parameters. The quantitative traits were compared between the our study in Mansura (Libya) with groups previously identified in Ghomrassen (Tunisia) and FEZ (Morocco). The quantitative parameters are the leaves length (LL), the leaves width (LW), the seed length and width (SL and SW) and the weight of 1000 seeds (SW g). *Capparis spinosa* was collected in Mansura (Libya).

The quantitative parameters have been analyzed on samples that has been taken from six caper plants, 20 leaves from each one. Sampling was performed from Tunisia. According to plant frequencies, five individuals were collected in areas ranging from 0.5 and 1 ha. The quantitative parameters have been analyzed the weight of seeds (SW1000 g). *Capparis spinosa* collected in July 2016 in FEZ regions, the samples of 90 leaves have been taken from three caper plants, (30 leaves per plant) have been chosen for the characterization. The weight of 1000 seeds has been done by a precision numerical balance.



Figure 1. Different parts of *Capparis spinosa* studied: (a) plant, (b) leaves, (c) and seeds.

RESULT AND DISCUSSION

Leaves are one of the organs that are in plants and generally grow on twigs, the leaves are generally green because the leaves are organs that contain chlorophyll.

Table 2. Morphological properties of *Capparis spinosa* leaves and seeds

populations	LL (mm)	LW (mm)	SL (mm)	SW (mm)	SW (1000g)
Mansura (Libya)	32.2	29.2	3.2	2.4	7.435
Ghomrassen (Tunisia)	43	37	3.1	2.6	7.2
FEZ (Morocco)	30.81	22.397	8.65	7.97	137

Leaves generally have the main function as a place for photosynthesis to take place in plants, as a regulator of the transpiration or evaporation process when the plant body lacks or has excess water. And the leaves are also a place for O₂ and CO₂ in and out. A seed is the product of the ripened ovule of gymnosperm and angiosperm plants which occurs after fertilization and some growth with in the motherplant. The Main functions of seeds are Germinate to produce next generation of plants, Store food for first stages of plant grow, Protect the embryo plant and Survive adverse growing conditions. The results of Quantitative morphological parameters in Libya, Tunisia and Morocco were showed in Table (2). Revealed that the high average of length of leaves was 43 mm in Tunisia, while in Libya and morocco were (32.2 and 30.81mm) respectively. Whereas the range of leaves width was between (22.397 to 37 mm), the value of LW in Mansura had been 29.2 mm. However the less one have been showed in FEZ and in Ghomrassen had been the biggest. The morphology characteristics of seeds, length, width and weight showed a no difference between the two populations (Libya and Tunisia). A crucial difference of seeds weight was (137 g), 8.65 mm length and 7.97 mm width in FEZ. Probably, the diversity in the seed weight has been influenced by the internal variables and the environment of the maternal.

Conclusion

A variation was observed in the Morphological parameters in study places. The highest weight of 1000 seeds, seeds length and seeds width had been showed in Morocco, which was 137g, 8.65mm and 7.97mm respectively. However the seeds parameters were closely same in the other places. On the other side in Morocco have been shown the smaller result of leaf length and leaf width. The results were different in Libya and Tunisia. In this study the morphological characteristics have been impacted by location. There also are some factors which effect on morphological properties such as soil characteristic and molecular studies, that we suggest studying to investigate *C. spinosa* more carefully.

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