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# Contribution to the vascular flora of the archaeological park of Selinunte and Cave of Cusa (South-Western Sicily, Italy): preliminary results*

**Abstract**

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This study aims to present a complete inventory of the vascular flora of the Archaeological Park of Selinunte. A total of 443 specific and infraspecific taxa are here reported. *Fabaceae* was the most collected family with 47 species. *Asteraceae* and *Poaceae* were the next largest families with 45 and 35 species, respectively. *Euphorbia* was the largest genus, represented by 9 species. The analysis of the biological spectrum of the vascular flora indicate the predominance of therophytes (42%) and hemicryptophytes (22%) while, from a chorological point of view, most of the species show a Mediterranean distribution. The presence of *Cynara cardunculus* subsp. *zingaroensis* (taxon endemic to W-Sicily) is reported for the first time for the investigated area.

*Key words*: archaeological areas, vascular flora, endemics, alien species, Sicily, Italy.

## Introduction

Archaeological sites in the Mediterranean Basin are often of great artistic and historical value and play an important role in the tourist industry (Celesti-Grapow & Blasi 2004).

Among these, the Archaeological Park of Selinunte and Cave of Cusa (Trapani Province) is, certainly, one of the largest and most extraordinary archaeological sites in the Western Mediterranean.

This contribution is limited only to the part of the park around the ancient city of Selinunte. This area and its temples represented the western part of the Greek advance in Sicily. It was founded in 651-650 B.C. and built with calcarenites extracted from the quarries of the near locality Cusa, in Campobello di Mazzara territory (Trapani Province) (Brai & al. 2004).

*Extended and enriched version of the poster presented at the International Symposium "Botany at the intersection of Nature, Culture, Art and Science", Selinunte, 28-30 June 2018.

The toponym “Selinunte” probably, is due to savage parsley, ‘selinon’ in ancient Greek, which in tern refers to *Apium* spp. growing wild in such moist habitats (Guarino & Pasta 2017) and was also present on the local coins (Fabbrocino & al. 2001).

The Archaeological Park, with almost 270 hectares of extension, houses also elements of flora and vegetation of great natural value.

The site is also characterized by the presence of wide sandy dunes included in “The Natural Reserve Foce of Belice and Dune Limitrofe" and in the SIC (Sites of Community Interest) ITA010011 named “Dunal system of Capo Granitola, Porto Palo and Foce of Belice”.

Nevertheless, very poor are studies carried out on the flora and vegetation on this area (Frei 1937; Brullo & al. 1974; Speranza & al. 1993; Troia & Spallino 2009).

Furthermore, in the past, plant cover and Mediterranean maquis of the Selinunte archaeological site have been attentioned by various landscape ecologists, mainly with regard to its restoration (Raimondo & al. 1991; Raimondo & al. 2018), however at today, a floristic inventory of the whole area is still missing.

In 2018, the project “Census of the vascular plants of the Archaeological Park of Selinunte and Cave of Cusa” started, with the aim of improving the botanical knowledge of this area and to produce a complete check-list of this flora.

## The studied area

The Archaeological area of Selinunte is located on the southwest coast of Sicily in the central part of the coastline, between Capo Granitola and Capo San Marco (south-western Sicily).

It is stretched over three hills that from east to west are: Marinella or Eastern Hill, Manuzza and Gaggera Hills (Piro & Vesinon 1995), and it is part of a territory that is represented by Modione basin and partially by the Belice basin (Fig. 1). The area is characterized by clay or clayey-marl with sand breakthroughs covered by calcarenites (Liguori & Porcaro 2010) it falls in the floristic subunit “2.3.1 Southern and Western coast” (Domina & al. 2018a). Phytogeographically, the site falls in the Drepano-Panormitano district. (Brullo & al. 1995).

According to Bazan & al. (2015), the bioclimate of the area can be defined lower thermomediterranean and lower dry, with annual average temperature around 18 ° C and upper dry ombrotype (average annual rainfall of 500 mm) (La Rosa & al. 2012).

## Material and Methods

Inventory of the flora was carried in the year 2018, from February to August, several samplings were performed in order to cover the whole area investigated.

Herbarium specimens have been collected and stored in the Herbarium Mediterraneum Panormitanum (PAL-Gr), acronym according to Thiers (2018).

For the taxa identification, we mainly referred mainly to the Italian floras (Fiori 1923-29; Pignatti 1982) and systematic revisions and monographs (Delforge 2005; Giardina & al. 2007; Venturella & al. 2007; Domina & al. 2011).

In the floristic list, the systematic order and taxonomic circumscription of the families


Fig. 1. Study area: the Archaeological Park of Selinunte (Sicily, Italy).

follow Bartolucci & al. (2018) and Galasso & al. (2018). Taxa are ordered alphabetically within each family. Life forms and chorological types of natural and alien taxa are according respectively to Raimondo & al. (2010) and Raimondo & al. (2005), while cultivated plant follow Bazan & al. (2005).

**Results and Discussion**

A total of 443 specific and infraspecific taxa currently occur on the Archaeological Park of Selinunte, belonging to 302 genera and 85 families. *Fabaceae* was the largest family with 47 species. *Asteraceae* and *Poaceae* were the next largest families with 45 and 35 species. *Euphorbia* was the largest genus, represented by 9 species.

The life form spectrum (Fig. 2A) shows a dominance of Therophytes (42%), followed by Hemicryptophytes (22%), Phanerophytes (15%) and Geophytes (11%). From a chorological viewpoint, most species show a Mediterranean distribution (Stenomedit. and Eurimedit.) (Fig. 2B).

Italian endemics are seven (Raimondo & al. 2010; Bartolucci & al. 2018) which amounted to 2% of the taxa observed. In particular, only two taxa are endemic to Sicily:

- *Cynara cardunculus* subsp. *zingaroensis* (Raimondo & Domina) Raimondo & Domina (Fig. 3A), is endemic to W-Sicily (Raimondo & al. 2004). The population founded in the Eastern Hill has never been reported at today and therefore it is the first record for this area.

- *Limonium selinuntinum* Brullo (Fig. 3B), is a narrow endemic that occur only on the sea cliffs in in the Archaeological Park of Selinunte. (Brullo 1980). At today, the total pop-

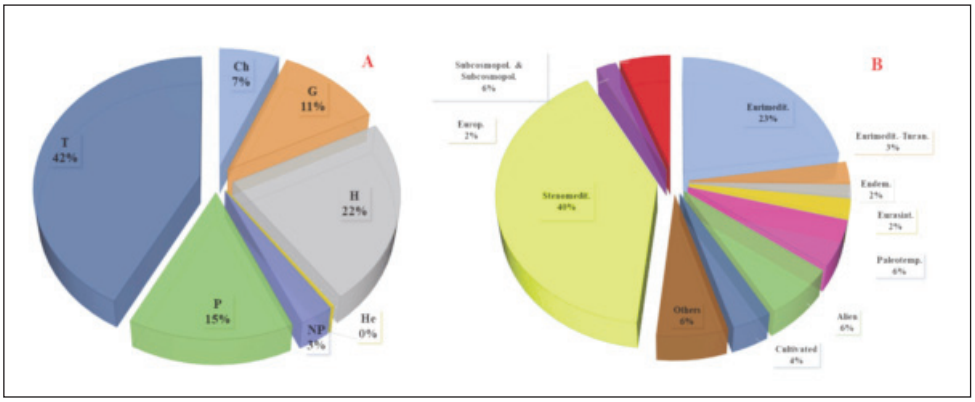


Fig. 2. A) Biological spectrum of the vascular flora of Archaeological Park of Selinunte. Ch - chamaephytes; G - geophytes; H - hemicryptophytes; He - helophytes; NP - nanophanerophytes; P - phanerophytes; T - therophytes; and B) The Chorological spectrum.

ulation is estimated to be fewer than 200 individuals. Its range is seriously threatened due to strong anthropogenic pressure present in the investigated area.

*Antirrhinum siculum* Mill. shows wide Italian distribution, three taxa are endemic to Southern Italy (*Euphorbia ceratocarpa* Ten; Gypsophila arrostii Guss. subsp. *arrostii; Retama raetam* (Forssk.) Webb & Berthel. subsp. *gussonei* (Webb) Greuter), and *Seseli tortuosum* subsp. *maritimum* (Guss.) C.Brullo, Brullo, Giusso & Sciandr. is endemic to Southern Italy and Sardinia.

Others taxa with particular phytogeographical interest are: *Ajuga iva* subsp. *pseudoiva* (DC.) Briq., *Crucianella marittima* L. *Echium sabulicola* Pomel subsp. *sabulicola, Launaea fragilis* (Asso) Pau, *Lomelosia rutifolia* (Vahl) Avino & P. Caputo, and *Pancratium maritimum* L.

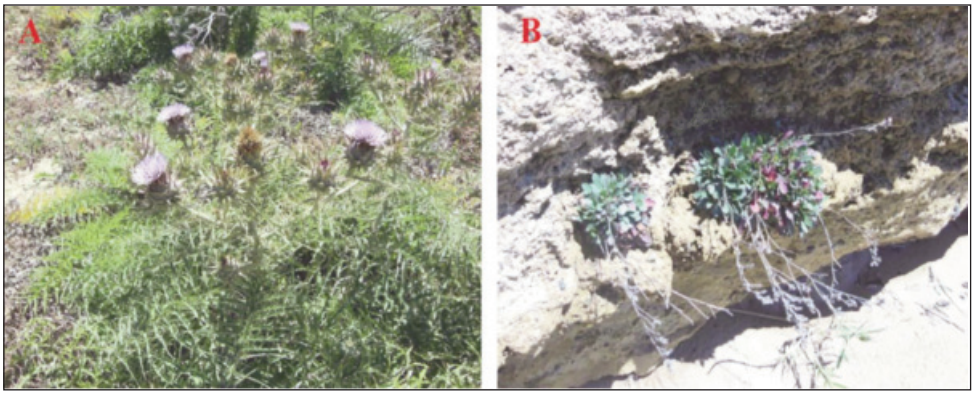


Fig. 3. A) *C. cardunculus* L. subsp. *zingaroensis* (Raimondo & Domina) Raimondo & Domina; B) *L. selinuntinum* Brullo.


Fig. 4. Some alien taxa in the Archaeological Park of Selinunte: A) *Ailanthus altissima*; B) *Agave americana* subsp. *americana;* C) *Carpobrotus edulis*.

Our results confirm that this area is among the richest in biodiversity of the southern coast of Sicily as reported in Domina & al. (2018b). The present contribution has also highlighted the presence of the high number of alien species (29 taxa), mostly naturalized and sometimes more or less invasive (Fig. 4) such as: *Ailanthus altissima* (Mill.) Swingle, *Carpobrotus edulis* (L.) N. E. Br., *Eucalyptus camaldulensis* Dehnh. subsp. *camaldulensis, Phoenix canariensis* H. Wildpret. and *Vachellia karroo* (Hayne) Banfi & Galasso. Other alien species (13 taxa) are cultivated in the Archaeological Park for ornamental purposes.

Moreover, on the basis of our observations in the field the exclusion of *Scrophularia frutescens* L., is confirmed. In the past, its presence in the dune system was reported by Brullo & al. (1974) and misidentified with *S. canina* L.

At the end, due to its specific climatological position and habitat diversity, we can expect that the investigated area hosts more species than currently recorded.

The complete list of taxa is reported in online Appendix to this volume (ESF1).

## Conclusion

This study not only highlighted the great naturalistic value of the studied area, but also allowed to verify some critical issues such as the presence and sometimes large spread of some invasive alien species which threaten not only local biodiversity but also the monuments themselves. In fact, the damage inflicted by alien plants on the country's historical heritage is a particularly relevant issue in Italy (Celesti-Grapow & al. 2009).

It would be desirable in the future, that alien species present in this archaeological site to be constantly monitored and to prevent their diffusion through a landscape management plan that involving regular containment and eradication interventions.

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