Vegetation history over the last 2500 years: a multi-site approach in Maremma (Tuscany, Italy)

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Summary: *The aim of this work in progress is to study vegetation and forest cover changes in a large area in Southern Tuscany (Central Italy) by means of charcoal analysis with an innovative multiple site approach. Charcoal remains come from six archaeological sites, dated between the 6th-5th c. BC to the 15th c. AD, from Etruscan period to Middle Age. The sampled contexts were carefully selected since only dispersed charcoals represents a long term collecting of the wood, and is therefore more likely to reflect the local vegetation. Establishing the changes in the vegetation cover, with a high resolution in detecting human impact, this approach allows to determine a reasonable diachronical spatial pattern.*

Key words: *dispersed charcoals, forest cover changes, Mediterranean vegetation, human impact.*

INTRODUCTION

In Southern Tuscany (Italy), in spite of the abundance of archaeological excavations, few studies dealing with charcoal analyses were carried out; attempts to reconstruct vegetation history are mainly carried out by means of pollen analysis, above all from the lake deposits. The interdisciplinary studies of the sediments of Lago dell'Accesa (Magny *et al.*, 2006; Drescher-Schneider *et al.*, 2007; Magny *et al.*, 2007) and of the Ombrone alluvial plain (Biserni and van Geel, 2005), involving both sedimentologists and palaeobotanists, provided a record of vegetation and climatic change spanning over 15,000 years, until 2500 BP.

The Holocene vegetation inferred from pollen data of Accesa Lake is characterised by alternating dominance of deciduous oaks and *Quercus ilex* (Drescher-*Schneider et al.*, 2007). A low resolution in detecting human impact was achieved from these data, due to the difficulties in distinguishing between changes in the vegetation cover induced by man from those caused by climatic changes in the Mediterranean region (Drescher-Schneider *et al.*, 2007). Human impact seems to start during the Neolithic period, and increases in the Early Bronze Age. Afterward, the human impact in Iron Age and Etruscan period is detected by the increasing values of arable crops and of species of the secondary forest canopy with a declining deciduous oak forest (Biserni and van Geel, 2005; Drescher-Schneider *et al.*, 2007). Finally the last 2500 years were poorly represented in very few upper centimeters of the cores and were not studied in these works.

MATERIALS AND METHODS

The human presence was continuous in the Southern Tyrrhenian Tuscany: Etruscan, Roman and Medieval settlements follow one another in the area and several archeological sites have been excavated during the last ten years and a lot of charred botanical remains have been available. Thus, despite pollen have been until now the most studied remains, charcoal analysis could provide a better spatial resolution and a finest identification level.

The aim of this work is to study vegetation and forest cover changes in a large area of Maremma in the Southern Tuscany, from Etruscan period to Late Middle Age. To determine a reasonable spatial pattern, charcoal analysis is carried out with an innovative multisite approach. Charcoal remains come from six archaeological sites, dated between the 6th -5th c. BC to the 15th c. AD, located along 100 km of the Tyrrhenian coast (Fig. 1).

The analyzed sites are, from north to south, the Castle of Donoratico, dated from Late Roman Age to 15th c. AD, the Acropolis of Populonia, dated from 2th c. BC to the third quarter of 1th c. BC and from 9th c. AD to 13th c. AD, the Roman building of Vignale, dated from 3th c. BC to 5th AD, the Roman harbour of Spolverino near river Ombrone, from 2nd c. AD to 5th c. AD, the Roman temple area of Lo Scoglietto, from 1th c. AD to 6th c. AD, the Etruscan residence "Casa delle Anfore", dated 6th c. BC-5th c. BC.

FIGURE 1. Map of the research area: location of the archaeological and main sites cited in the text. 1. Castle of Donoratico; 2. Accesa Lake; 3. Acropolis of Populonia; 4. Roman building of Vignale; 5. Grosseto; 6. Ombrone alluvial plain; 7. Roman harbour of Spolverino near river Ombrone; 8. Roman temple area of Lo Scoglietto; 9. Etruscan residence "Casa delle Anfore" (Marsiliana-Manciano).

The sampled contexts were carefully selected since only dispersed charcoals represents a long term collecting of the wood, and is therefore more likely to reflect the local vegetation; these contexts are living layers, waste pits, silos, collapses, furnaces, fireplaces, fills layers. Adequate volumes of sediments were collected in order to obtain enough charcoals to analyse. In addition, the living layers were sampled using a grid (1x1 m2), the pits were sampled by means of uniform sized cuts and fireplaces and concentrated charcoals were totally collected. Identification is still in progress, at least 250 charcoals will be studied for each context, the lower amount of charcoal in some layer will be taken into account for the interpretation of the data.

EXPECTED RESULTS

We expect that this multiple site approach and the large time interval spanned by our sites will allow some open questions to be resolved:

- to establish if the present evergreen vegetation can be referred to degradation of a deciduous forest or if, according the map of the potential vegetation by Mondino (1998), these sites are located in the zone of holm's oak wood and macchia vegetation;
- to detect the beginning of extensive Olive cultivation;
- to asses the human impact in terms of deforestation through all the investigated period.

The first available data seems to show a strong relationship between the vegetation features and the historical background of the sites (Fig. 2); at Populonia, for example, the mixed deciduous forest increase when human presence is lower and thus indicating that evergreen vegetation can be considered as the degradation of a deciduous forest. Concerning the history of olive cultivation, few data comes from Populonia, where the extensive cultivation begin in Medieval time.

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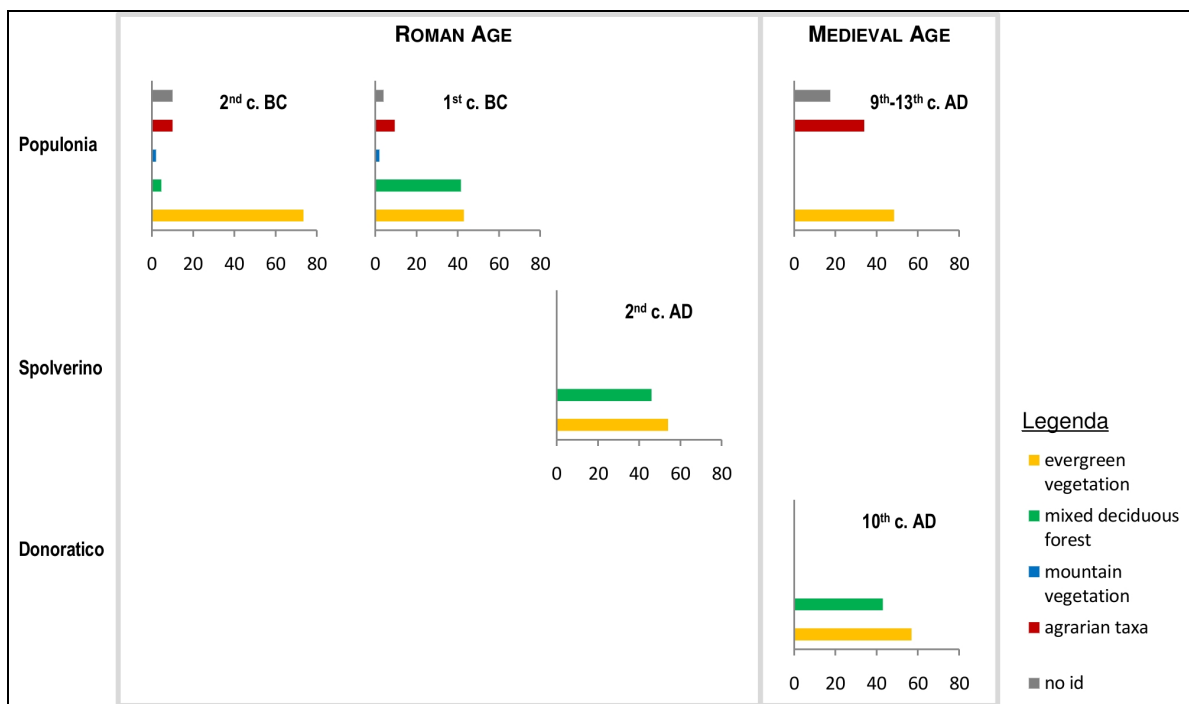
FIGURE 2. Charcoal data from acropolis of Populonia, Roman harbour of Spolverino and Castle of Donoratico. Bars represent the percentage of main vegetation types calculated as sum of the relative single taxa.