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UNDER THE PATRONAGE OF



First palynological data from the “Vasca Inferiore di Noceto”, an artificial mire of the Bronze Age in the Po Plain

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Introduction

In the framework of the national-funded project SUCCESSO-TERRA (PRIN-20158KBLNB), an interdisciplinary geoarchaeological and archaeobotanical (pollen and macroremains) investigation has been carried out, aiming at reconstructing the land transformations that occurred at the onset, duration, and end of the Terramare culture in the southern-central Po Plain (Emilia Romagna region). The Terramare are archaeological remains of a unique cultural phenomenon: banked and moated villages that were located in the Po River alluvial plain, dated to Middle and Recent Bronze ages (1550-1170 years BC; Cremaschi et al. 2016).

An artificial basin of the Middle Bronze Age, built and delimited entirely with oak wood, was found in the spring of 2004 in Noceto, in the province of Parma. Due to the unusual and, at the same time, extraordinary character of this site, the intervention promoted by the Soprintendenza per i Beni Archeologici dell'Emilia Romagna was timely. The excavation campaigns that followed, thanks to the cooperation with the Università di Milano and Comune di Noceto, brought to light bio-archaeological materials in a good state of conservation because they were always submerged in the water in a deposit of saturated clay until they were found (Cremaschi et al. 2009). In the 2015 following excavations, it was discovered that this structure (Fig. 1) was built after the collapse of an older and wider basin. The latter is called “Vasca Inferiore” for its position. The use of both structures covered a period of about one century.

Materials and Methods

Pollen samples of “Vasca Inferiore” were collected in 2015 from two vertical trenches, in close succession, excavated in the northeast corner of the site. The samples were treated using a pollen extraction method that also includes sieving and heavy liquid floatation to concentrate pollen and non-pollen palynomorphs.

Results and Discussion

The concentration of pollen was good and pollen was well preserved. This allowed recognition of a high biodiversity: the floristic list includes 204 taxa.

The results obtained from the pollen analysis of “Vasca Inferiore di Noceto” provide a detailed knowledge of the plant cover and the plants available for the various human activities carried out around the basin itself in a century.

The incidence of wet environments (Fig. 2) was low, even though the anthropic origin of the structure and the nature of some plants (like hydrophytes which are known to be low pollen producers) make the palynological image of wet environments overall significant. The characteristic elements of this environment are hygrophilous trees (e.g., *Salix*), hydrophilous herbs with prevalence of herbaceous limno-telmatophytes (like Cyperaceae undiff. and *Phragmites*, the last one distinguishable among Poaceae through the size of its pollen grain

< 26 µm; Faegri et al. 1989) on hydrophytes (like *Hydrocharis morsus-ranae*, *Nuphar* and *Potamogeton*), and algae *sensu lato* (non-pollen palynomorphs).



Figure 1 - View of the excavation campaign 2015.

Data suggest that the artificial mire was continuously and carefully cleaned, probably to facilitate the accessibility to the basin. Interestingly, some hydrophytes represented in pollen spectra (like *Nymphaea alba* type) have ornamental value and this suggests that beautiful flowers were probably cared and not eliminated by cleaning actions. Degradation of organic matter was responsible of an eutrophic state of the water, suggested by the presence of *Lemna* (highly resistant to eutrophic conditions; Radić et al. 2010) and, in particular, of *Rivularia* type Cyanobacteria (Revelles et al. 2016).

There are many evidences of the continuative human pressure and changes in soil composition. The Anthropogenic Pollen Indicators-API group (Mercuri et al. 2013) are significant together with other synanthropic plants in pollen spectra (Behre 1986; Cremaschi et al. 2016; Pignatti 1982). Among these plants, there are nitrophilous species, ruderals and several weeds of cereal crops. Moreover, the presence of humans and animals is also testified by spores of coprophilous fungi and, only in a few samples, by eggs of intestinal parasites.

A peculiar character of this deposit is the presence of pollen of many entomophilous species in the diagram. The entomophilous species are scarce pollen producers, usually have beautiful, sometimes showy, sometimes fragrant flowers, and some of these plants also have medicinal effects, probably already known at the Bronze Age. The abundance and the diversity of these pollen types, combined with the state of preservation of some of them, suggest that flowers and inflorescences were deposited in the water.

Conclusions

This palynological research allows to investigate the relationships between human action and a special artificial wet environment during the Bronze Age by providing biological data to an archaeological context. The results give useful information for a better understanding of current human impact on small mires as they show how much it limits the development of biotic communities and the formation of true ecological successions. The study may be a contribution to conservation studies and sustainable management plans of human environments in the Po Plain.



Figure 2 - Pollen from Hygro-Hydrophytes (a-f) and algal elements (g-h) identified in Vasca Inferiore di Noceto: a) *Salix*; b) *Scirpus* type; c) *Phragmites*; d) *Butomus umbellatus*; e) *Nymphaea alba* type; f) *Nuphar*; g) *Pseudoschizaea*; h) *Rivularia* type. The scale is 10 μm .

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