

Fuel wood use in a lime kiln at *Egnathia* (South-eastern Italy) during Late Antiquity

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Summary: During the last archaeological investigation at *Egnathia* (South-eastern Italy) a lime kiln was found. The anthracological study, jointed to taphonomical and size analyses of the charcoals, allow us to define the use of wood as fuel and to recognize specific utilization of timber (carpentry wood) derived from dismissed structures.

Key words: lime kiln, charcoal analyses, Late Antiquity, wood management, south-eastern Italy.

INTRODUCTION

Since 2009, the collaboration between the Laboratory of Archaeobotany and Palaeoecology of the University of Salento and the Department of Antiquity of the University of Bari has allowed to apply tailored archaeobotanical analysis at *Egnathia*. The aim of this work is to study human-environmental interaction, in particular: i) the exploitation of plant resources, ii) the identification of the catchment area.

The site is settled on the Adriatic coast of Apulia region, on the border between Messapia and Peucezia ancient regions (Fig. 1). Its location favored a long anthropic history, from the Bronze Age (16th-15th century BC) till the medieval period (10th-15th century AD). In particular, *Egnathia* has played a central role in the trade between the Mediterranean Basin and the Apulian hinterland during the Roman period and the Late Antiquity.

Baths, were re-functionalized as productive structures (e.g. lime kilns).

Actually, few studies were conducted on ancient lime kilns especially focusing on structures and on the reconstruction of the different phases of lime production (Jackson, 1973; Gelichi and Novara, 1990; Baragli, 1998; Petrella, 2007). Many ethnoarchaeological studies give information about lime kiln fuel used in Italy (De Guio, 1995; Bandini *et al*, 1999; De Guio and Bressan 2000; Balenzano and Moresi, 2004) and in other countries in the last century (Adam, 1994).

DATA AND RESULT

The lime kiln of *Egnathia* is located to the south of the Episcopal basilica (Fig. 2). The furnace was recovered filled with its original charge: calcareous stones and fuel. The furnace has a truncated cone shape and a diameter of about 3 meters.



FIGURE 1. Location of *Egnathia*.

Archaeological investigations show a series of Late Antiquity structures built after the earthquake of 365 AD. In this period, in fact, *Egnathia* underwent an urban reorganization: some public buildings, such as the



FIGURE 2. Lime kiln found in the area to the south of the basilica.

The samples were collected from all layers of the furnace. The charcoals belong to two main dimensional categories: small (< 1 cm) and bigger charcoals (> 7 cm). The latter are slightly vitrified and characterized by radial cracking; they constitute the main part of the assemblage. The quantitative difference between the two size categories could be due to combustion activity

who has acted more destructively towards the smaller branches (Fig. 3).

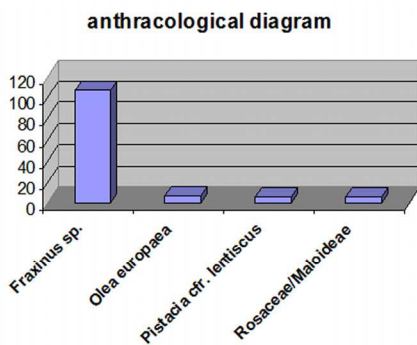


FIGURE 3. Anthracological diagram .

Anthracological analyses identified four taxa: *Fraxinus* sp., *Olea europaea*, *Pistacia lentiscus* and *Pyrus/Sorbus* type (Rosaceae/Maloideae). *Pyrus/Sorbus* has been recognized also as fuel in the hypocaust of the *tepidarium*. The larger charcoals belong exclusively to *Fraxinus* sp., while smaller fragments are related to the other species.

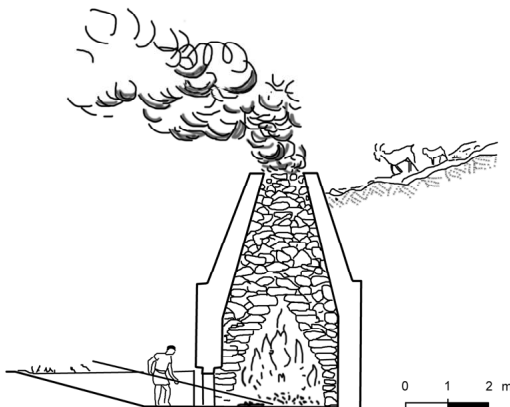


FIGURE 4. Example of a lime kiln (by Adam 1994, modified)

DISCUSSION

The ethnological examples describe the use of olive stones, almond shells and small branches as lime kiln fuel, probably due to their ability to guarantee a rich flame (Adam, 1994; Balenzano and Moresi, 2004); only in few cases wood was used (Bandini *et al.*, 1999).

In our study the fuel wood selected seems to respond to a particular demand: ash wood, defined by high calorific value, represents a probable re-utilization of carpentry material. The other taxa were used as branches to develop a flame able to reach the upper calcareous stones (Fig. 4).

CONCLUSION

The anthracological analysis of the lime kiln of *Egnathia* shows the use of fuel derived from carpentry wood and available wood taxa growing near the site: in this way the best result in terms of calorific value and duration is obtained.

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REFERENCES

- ADAM, J.P., 1994. *L'arte di costruire presso i Romani: materiali e tecniche*. Milano: Longanesi.
- BALENZANO, F., MORESI, M., 2004. Scorie vetrose da fornaci per la produzione artigianale di calce viva (Minervino Murge-Bari). *Atti Soc. Sci. Nat., Mem. Serie A.*, 109, 57-68.
- BANDINI, F., MONTANARI, C., SPINETTI, A., 1999. Quarta campagna di archeologia ambientale di Vobbia (Ge): i forni da calce. Relazione preliminare. *Archeologia Postmedievale* III, 11-21.
- BARAGLI, S., 1998. L'uso della calce nei cantieri medievali (Italia centro-settentrionale): qualche considerazione sulla tipologia delle fonti. *Archeologia dell'Architettura* III, 125-139.
- DE GUIO, A., (Ed.), 1995. "Ethnoarchaeology of us": calcare e carbonare a Lusitana. *Quaderni di Archeologia del Veneto* XI, 166-178.
- DE GUIO, A., BRESSAN, C., 2000. Tra "archéologie événementielle" e "longue durée": il caso di studio delle calcare dell'Altopiano di Asiago (VI). *Archeologia Postmedievale* IV, 73-96.
- GELICHI, S., NOVARA, P., 1990. Una calcara tardo antica nel territorio imolese. *Studi e Documenti di Archeologia* VI, 72.
- JACKSON, D., 1973. A roman lime kiln at Weekly. Northants. *Britannia* 4, 128-140.
- PETRELLA, G., 2007. La produzione della calce: stato degli studi e proposta di scheda di informatizzazione dei dati di un forno da calce. *Archeologia Postmedievale* XI, 151-172.