PhD School on Agriculture, Environment and Bioenergy

(http://sites.unimi.it/dottorato_aab/)

(XXXIX cycle, 2023-26)

Project draft

1. Field of interest

- Degrees in Humanities (Archaeology, History, Anthropology, Conservation Science in Cultural Heritage).

- MSc in scientific subjects: agricultural, environmental, biotechnology.

LM2 Archeologia; LM69 Scienze e tecnologie agrarie; LM74 Scienze e tecnologie geologiche; LM7 Biotecnologie agrarie; LM11 Conservazione e restauro dei Beni Culturali; LM53 Scienza e ingegneria dei materiali; LM75 Scienze e tecnologie per l'ambiente e il territorio; LM1 Antropologia

Degrees in other disciplines will be examined by the evaluation committee.

2. Project title

ArchaeoAgronomy and Archaeometry.

Archaeological and archaeometric research for the study of rural landscape, production and trade in Antiquity

3. Tutor (membro del Collegio dei Docenti)

Gloria Olcese

4. Relevance of the topic and state of the art:

For a long time, historians and archaeologists studying ancient production, agriculture and trade have often had incomplete and biased written sources or simply erroneous interpretations. Today, a multidisciplinary approach allows us to deepen our knowledge of transformations in the agricultural landscape and to reconstruct production and trade in Antiquity.

The aim of this project is just to encourage multidisciplinary studies of rural landscape, viticulture and wine in antiquity, of the production and circulation of food and its containers. It will use the disciplines of archaeology, archaeobotany, archaeometry (for example molecular-archaeology - biochemical analyses), which have provided significant contributions to the interpretation of ancient production and trade.

The focus of our investigation is the on-going transformation in the agricultural landscape. We also aim to focus on wine production facilities and structures, which have until now remained under-studied, such as rock-cut vats.

Trade of food goods in antiquity will also be the subject of research, combining archeological and laboratory methods, for example through provenance studies of ceramic containers in shipwrecks and at consumption-sites.

Such a multidisciplinary approach represents an important progress in our understanding of ancient technology and economy.

Ongoing archaeological projects in Italy *(www.immensaaequora.org*), especially in Campania (such as Ischia, Pompei, Cales, Capua), Latium (Ostia and Rome) and Sicily offer the possibility of conducting multidisciplinary studies about innovative themes of research.

5. Layout of the project (draft)

5.1. Materials & Methods:

The project intends to achieve its aims with an integrated use of archaeological and archaeometric methods. The principal steps are:

- field research on rural landscapes

- archaeological Excavations in the area of Ostia (Rome)

- research about archaeological finds in the deposits

- research on ceramics from contexts being studied (transport amphorae, cooking ceramics); for example, petrological/chemical analyses (XRF and polarization microscope) in order to relate containers to specific production sites.

- laboratory analyses of the residues preserved in pottery and in plastered archaeological floors (Gas chromatography-mass spectrometry (GC-MS) analysis, ancient DNA) to provide information regarding the substances that were processed therein (wine, oil, food...);

- identification of genetic relationships between the grape seeds of modern varieties and those from archaeological sites, through morphological and molecular comparison, that will allow to reconstruct the ancient rural landscape.

Among its activities, the project also includes participation in in-depth training courses, taught courses and upper-level seminars, each organized into a series of specific themes.

5.2. Schedule and major steps (3 years):

Year 1 - Literature search. Field studies in chosen areas/sites. Collection of samples for the laboratory analysis.

Learning of novel laboratory methodologies related to the project and application to the material (ceramic, vine…).

Year 2 - Continuation of Field Researches in chosen areas/sites. Analysis of preliminary data.

Year 3 - Processing of the data collected during the previous years. Thesis preparation. Final discussion.

6. Available funds

Fondi rettorali, Fondi Scavi archeologici di Ateneo.

7. Literature:

1) J.-P. Brun, N. Garnier, G. Olcese (a cura di), A. Making Wine in Western-Mediterranean, B. Production and the Trade of Amphorae: some new data from Italy. Panel 3.5.

Proceedings of the 19th International Congress of Classical Archaeology (Cologne - Bonn, 22 - 26 May 2018), Bonn 2020.

2) G. Olcese (a cura di), *Immensa Aequora Workshop Ricerche archeologiche, archeometriche e informatiche per la ricostruzione dell'economia e dei commerci nel bacino occidentale del Mediterraneo (meta IV sec. a.C. - I sec. d.C.). Atti del convegno (Roma 24-26 gennaio 2011)*, Roma 2013 (*Immensa Aequora* 3).

3) A. Ciacci, P. Rendini, A. Zifferero (a cura di), *Archeologia della vite e del vino in Toscana e nel Lazio. Dalle tecniche dell'indagine archeologica alle prospettive della biologia molecolare*, Borgo San Lorenzo 2012.

4) M. Jones, *Cacciatori di molecole*, Roma 2005.

5) B. Biagini, G. De Lorenzis, S. Imazio, O. Failla, A. Scienza, *Italian Wild Grapevine (Vitis vinifera L. subsp. sylvestris) Population: Insights into Eco-geographical Aspects and Genetic Structure*, Tree Genetics & Genomes 5, 2004, pp. 1369–1385.

6) J.-P. Brun, *Le vin et l'huile dans la Mediterranee antique : Viticulture, oleiculture et procedes de fabrication*, Paris 2003.

7) O. Failla, G. Forni, *Alle radici della civiltà del vino in Sicilia*. Atti del Convegno "Alle radici della Civiltà del vino nel Mediterraneo: 3000 anni di storia" (Menfi, 6 luglio 1996), Menfi 1999.

8) R. P. Evershed, *Organic Residue analysis in Archaeology: the Archaeological Biomarker Revolution*, in Archaeometry 50, 6, 2008, pp. 895-924.

9) N. Garnier, S.M. Valamoti, *Prehistoric wine-making at Dikili Tash (Northern Greece): Integrating residue analysis and archaeobotany*, JASc 74, 2016, pp. 195–206.

Available at: <http://www.sciencedirect.com/science/article/pii/S0305440316000558>

10) A. Scienza, O. Failla, *Circolazione varietale della vite nel Mediterraneo: lo stato della ricerca*, in G. M. Di Nocera, A. Guidi, A. Zifferero (a cura di), ArcheoTipico: l'archeologia come strumento per la ricostruzione del paesaggio e dell'alimentazione antica, Firenze 2016, pp. 13-30 (*Rivista di Storia dell'Agricoltura* 1/2).