

Wine in Sardinia. New Archaeological Data and Research Methodology

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Introduction

Vitis vinifera L. ssp. *vinifera* i.e. grapevine is one of the most ancient and precious fruit-bearing plants in the world. It played a prominent role in complex historical societies around the Mediterranean. Today, it is commonly accepted that the modern cultivars of *Vitis vinifera* are the result of the domestication of *Vitis vinifera* L. ssp. *Sylvestris*, i.e. wild vines. Wild vines are very common among the spontaneous plants of Sardinia. Recent research dates back the introduction of wine production and consumption in the region to the Early Bronze Age thanks to a combination of botanical finds and chemical residue analysis.

Carbonized grape pips have been found from the Early Bronze Age (2017–1751 cal. BC, 2 σ) site at Monte Meana, Santadi-CI,¹ while other evidence was discovered in the *domus* de Janas IV of S'Elighe Entosu, situated in the territory of Usini (Sassari) in northern Sardinia.² About this context, a recent anthracological study revealed the presence of a large amount of charred *Vitis vinifera* wood associated with grape pips in a hearth dated to the beginning of the Middle Bronze Age (ca. 1780–1630 BC).

An important quantity of *Vitis vinifera* grape seeds (7616 pips) has been found in the well of the San Marco nuraghe in Genuri; unfortunately the mineralization of the pips does not allow to determine the subspecies.³

During the Late Bronze Age (12th–10th cent. BC), different contexts have yielded evidence of the presence of *Vitis*, though not wine. In the Duos Nuraghes Nuragic settlement, the grape seeds found in the Late Bronze Age and Early Iron Age levels are pertaining to the squat type with short stalk which are characteristic of *Vitis vinifera* L. var. *sylvestris*. This is a wild species, which was often used in this period. According to the first analysis carried out by Corrie Bakels,⁴ these grape seeds belonged to the wild subspecies or *Vitis vinifera* L. var. *sylvestris* but, according to Philippe Marival, who made a re-examination of the samples, they would belong to an previous stage of domestication.⁵ Charred grapes were also found in hut 5 of the village built around the nuraghe Adoni in Villanovatulo.

The investigations carried out in the village of nuraghe Bau Nuraxi in Triei (NU) discovered pollen from *Vitis Vinifera* ssp. *Vinifera* associated with a fragmentary askoide jug in a layer of inside room 7 dated by radiocarbon around 1000 BC.⁶

Charred grape pips found in various rooms of the Nuragic village at Genna Maria in Villanovaforru (Early Iron Age) show cultivated vines alongside wild species pips.⁷ This site is also equipped with a basin and a spouted tank that are interpreted for pressing grapes.

Generally speaking, remains of winemaking process and instruments are scarce, with the exception of the presumed Nuragic press and basins found in the settlement of Monte Zara in Monastir Cagliari, in a hut dating back to 800 BC.

Many more seeds of *Vitis* are mentioned, for example from the Nuraghe Ortu Comidu, in the central southern part of the island and from the Nuraghe Toscono in central Sardinia, both dating to the Punic period, others dating to the Roman period (300 BC – AD 500).⁸

For the late prehistoric period, while the aforementioned discoveries are quantitatively or qualitatively little relevant, an extraordinary case is provided by the Bronze Age settlement of Sa Osa (Cabras). It is one of the few Sardinian archaeological sites that allow the reconstruction of a complete picture of the development of the exploitation of natural resources and agricultural technologies, such as wine production. During the archaeological excavations carried out in 2008–2009 near the village of Cabras, (Or), the Nuragic settlement of Sa Osa was discovered. Several small and medium-sized oblong pits and cylindrical deep wells dug into the underlying sandstone were filled with various sediments. These cavities originally had different functions (e.g. dwelling, quarry, water supply) but, at some point, they were used either as rubbish dumps or for storing foodstuffs. Plant remains, charred cereals (hulled barley, wheat), legumes and few waterlogged macro-remains, mostly fig and grape remains, were found inside two Middle Bronze Age wells (well-V and well-U). Well N, excavated in sandstone sediments to a maximum depth of 4.35 m, was filled by several stratigraphic units, containing abundant organic material including wood, charcoal, cork, seeds (mostly of *Vitis*), animal remains and pottery sherds, which date the backfilling to the end of the Late Bronze Age.⁹ Most seeds and fruits from Well-N were found in excellent state of preservation due to water logging. A total of 35 taxa were identified including fruits and berries. Radiocarbon dating of two grape pips collected at the depth of 1.40 and 2.15 m area indicates respectively 1286–1115 2 σ cal. BC and 1276–1088 2 σ cal. BC (OxA-25106, OxA-25107).¹⁰ The number of *Vitis vinifera* (ca. 0.8 litres for ca. 15,400 pips) and *Ficus carica* (ca. 4 litres for ca. 5 millions achenes) was very large, representing more than 90% of the total number of remains. For this reason, the number of these two taxa has been estimated according to the corresponding volume of thousand items of each taxon.¹¹

Previous research on seed morphology of the Sa Osa specimens showed a close relationship between the Sa Osa grape pips and some modern Sardinian varieties, probably both belonging to white grape varieties.¹² This could be considered as evidence for the domestication of grapes because these varieties would have been intentionally selected.

The discovery of wild and domesticated grape seeds in the same wells of Sa Osa suggests that wild and domesticated grapes were mixed together to prepare beverages. Moreover, traces of wine have been found also in cultic contexts, for examples at Abini (Teti).

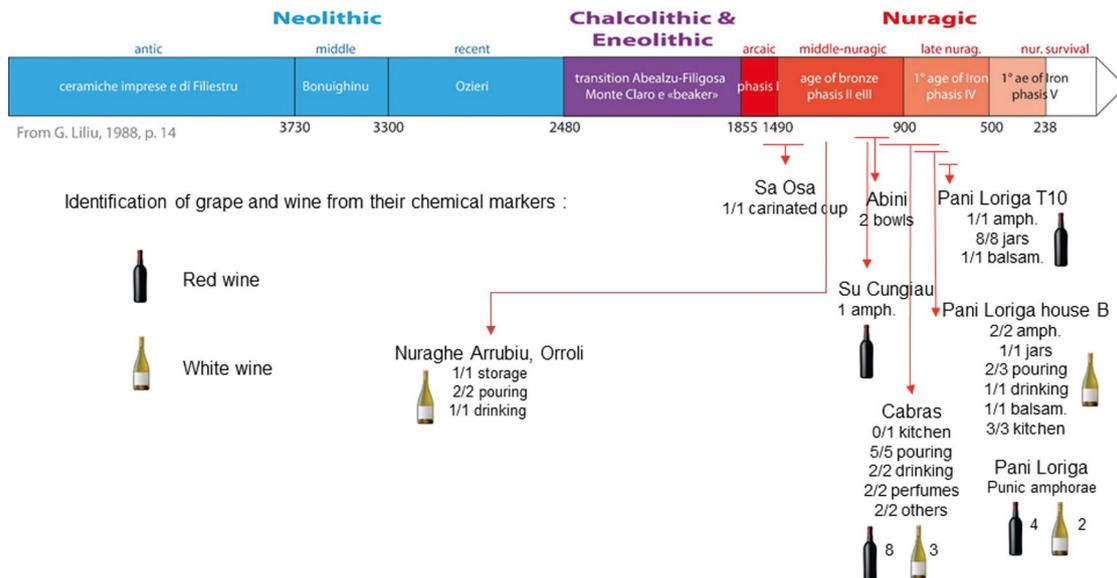


Fig. 1: Summary scheme relating to the documentation of wine in Sardinian later Prehistory.

The Organic Residue Analysis

Although some substances are difficult to identify and although there are risks of contamination both on the archaeological site and in the laboratory, reliable data can be obtained through biochemical analysis of ceramic vessels and their organic coatings. Recently, wine residues have been detected using specific extraction methods and analyses.

The presence of fermentation markers and of tartaric acid – which, albeit not exclusively produced by grapes, can be considered as characteristic of this fruit in this area and during this period – indicates that wine was poured into various vases. These analyses, we carried out in Sardinia by Nicolas Garnier using the protocol developed by Garnier and Valamoti,¹³ and by Alessandra Pecci using the protocol developed by Pecci and colleagues in 2013.¹⁴

In the first case they detected red and white wine residues in different vessels from the Bronze Age and from later periods at Nuraghe Arrubiu,¹⁵ Sa Osa,¹⁶ Pani Loriga¹⁷ on vessels found in funerary and in domestic contexts (fig. 1). In the nuraghe Arrubiu, a vase linked to a foundation ritual performed in the Torre A (beginning of the Late Bronze Age) and an askos found in the courtyard B (BF/PF1) contained white wine. Data from ceramic studies and from biochemical analyses suggest that the wine drunk during rituals might be locally produced following the white wine making process.¹⁸ At the end of the Bronze Age, a series of culinary pots reveals that wine was also commonly used for cooking.¹⁹

Wine making processes are detectable in Pani Loriga thanks to a series of Bartoloni D3 and D4 amphorae from the end of the 6th–5th c. BC. In one of these, a flat amphora

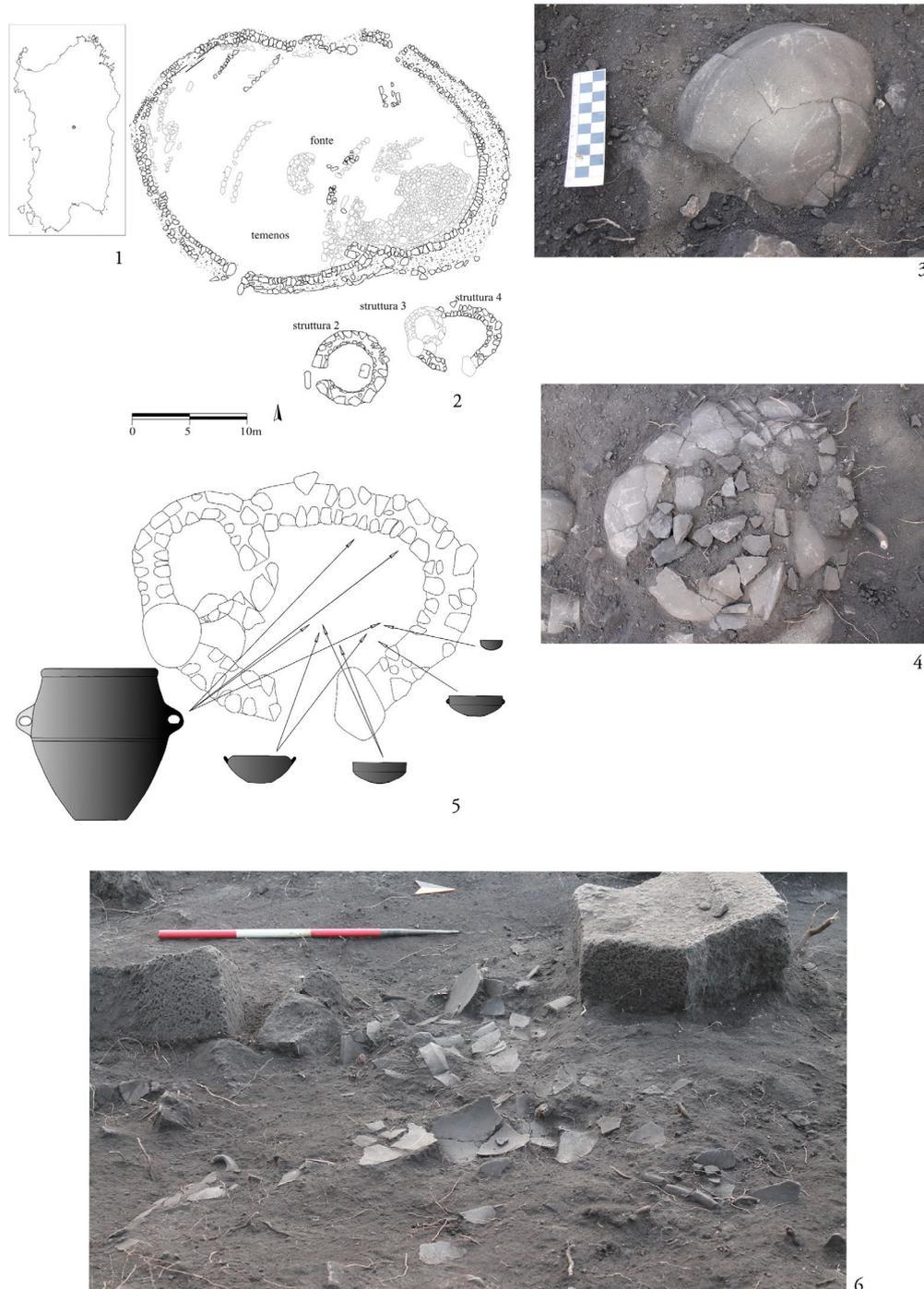


Fig. 2: Abini, Teti: 1. Localization of the archaeological complex; 2. Plan with the sanctuary' structures so far excavated. – Structure 4: 3. Carinated bowl found during the excavation; 4. Amount of sherds within the structure; 5. Spatial distribution of the main pottery shapes; 6. High concentration of pottery and bones at the center of the room.

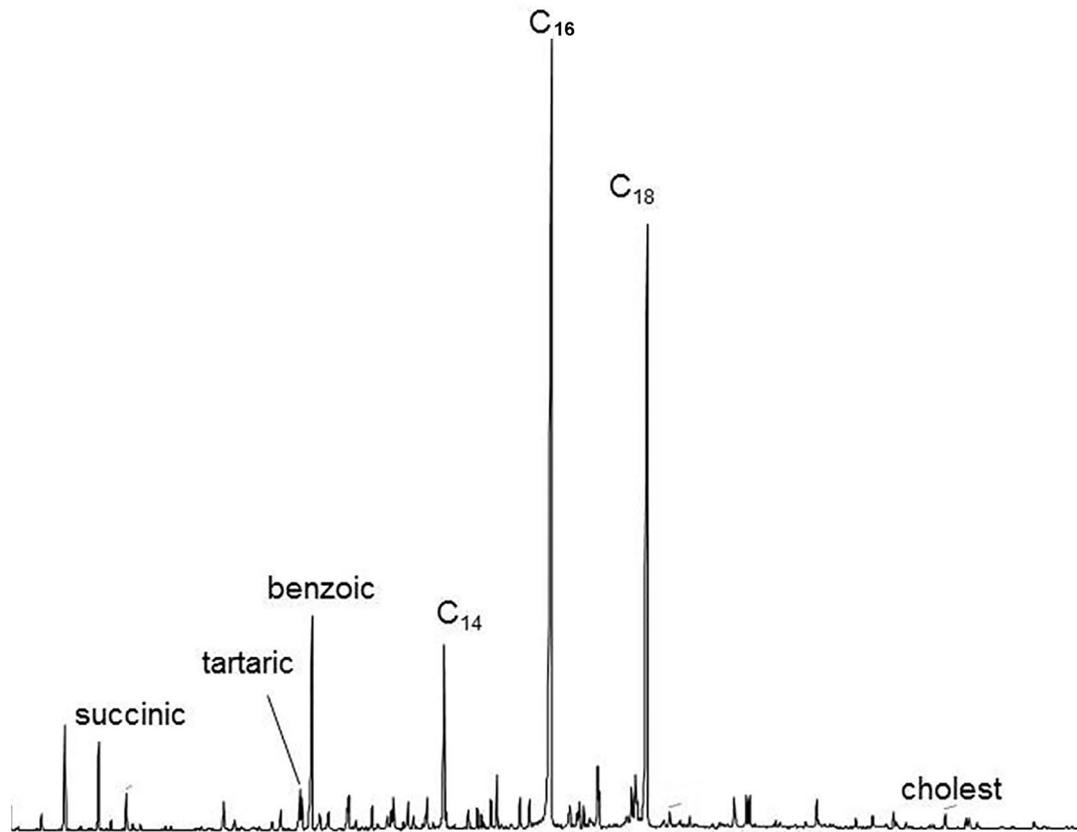


Fig. 3: Chromatogram of the extract (ii) from the carinated bowl from Abini, where wine residues were identified.

sherd was used as pallet for skimming the mixture of foam and yeasts produced during the fermentation process.²⁰ The study of a large series of storage and consumption vases suggests that the Pani Loriga settlement was producing and exporting white and red wines during the Punic era.

At the Nuragic sanctuary of Abini, the University of Sassari excavated a 12–11th c. BC burnt structure possibly related to the sanctuary. Among the materials found in situ (fig. 2), five vessels were sampled and analyzed by Alessandra Pecci at the University of Barcelona, following the method developed in Bristol for the lipid extract and the method developed by Pecci et. al. for the identification of wine markers.²¹ These analyses identified markers of wine residues and animal products in a bowl and in a carinated bowl (fig. 3). Another carinated bowl from Sa Osa, dated to the 14th–12th c. BC, revealed markers of wine, which match with the great quantity of pips discovered in the aforementioned pit/well.

The identification of wine residues in a carinated cup found in the Terramara di Pilastrini di Bondeno (northern Italy) suggests that this type of vase could have been used for wine consumption at that time.²²

The Production Facilities

The rock-cut presses are of significant interest due to their historical and archaeological value. These facilities were long neglected, probably because they could not be securely dated. Those already known are of doubtful and mysterious origin and it is difficult to interpret their typology and age. Our research project aims to clarify this topic through a corpus of rock-cut devices organized by type and function.²³

A recent study established a typologically organized gazetteer of the rock-cut devices surveyed in central-west Sardinia. This area, about 650 sq km wide, corresponds to the historical regions of Guilcer and Barigadu, in which 103 devices have been identified so far: 11 in the Guilcer territory and 92 in the Barigadu territory (to which we should add 55 mobile tanks).

Outside the surveyed area, analogous structures probably connected with wine making have been identified in some Nuragic settlements and in sites from the Punic and Roman periods (Genna Maria-Villanovaforru²⁴, Monte Zara-Monastir²⁵, Truncu 'and Molas-Terralba²⁶, s'Abba Druche²⁷, Arrubiu-Orroli²⁸, S'Imbalconadu-Olbia²⁹; other installations are reported in northwestern Sardinia).

The basic type includes two tanks – a treading basin and a collecting vat – excavated in the bedrock and linked by a hole or by an open channel. The treading floor presents a large flat surface, more or less deeply cut in the bedrock, sometimes delimited by a series of orthostats. These treading floors do vary in shape and dimensions, more than the collecting vats, and they present a slope towards a hole or drip that allowed the must to flow into the lower tank. On the pressing surface, the presence of drainage channels carved into the rock can be observed, especially when the slope is insufficient. The collecting vats, of various shapes, are placed at a lower level than the treading floors. Their bottom presents a carved depression used for collecting liquid and solid residues.

Five classes of rock-cut facilities have been defined:

Type I presents a rectangular treading basin with rounded corners. The collecting vat, generally of semi-circular form, is located at a lower altitude.

Type II is slightly carved in rocky areas where pressing basins usually have a semi-circular shape and a low depth. In some cases, probably to avoid problems caused by the little depth, the basin is bounded by a series of orthostats, a stone wall or a combination of both.

Type III is characterized by the presence of rectangular or sub-rectangular pits, excavated more or less deeply into the bedrock.

Type IV includes mixed installations, those where the treading basin is carved in the bedrock, while the collection tank is mobile, being carved in a single boulder.

Type V groups all other installations combining some of these characteristics randomly.

The mobile tanks can be classified in two clusters: those carved in “erratic” large-medium blocks with the inner face uniquely carved and those finely carved in smaller blocks outside and inside. In the survey area, a total of 55 tanks were registered.

We have learnt up to now that there is a considerable quantity of production facilities and structural differentiations, which do not simply depend on local differences. The archaeological picture is much less homogeneous than previously thought, due to different cultural roots and distinct traditions of life and work. In order to deepen these issues, an area of 1 km radius has been delimited around each device. The choice of the size of the area was intended to better focus the archaeological context. From the study of the *palmenti* in relation to the closest dated archaeological site, we observed that the situation varies according to the type of device -immovable or mobile-. The 29% of the immovable plants fall close to archaeological evidence dating back to pre-Nuragic times; 9.7% near a settlement referable exclusively dated from the Nuragic era; 3.8% are close to Nuragic contexts also frequented in later periods; 34% are near Roman settlements or necropolis.

The analysis of the relationship between mobile devices and other archaeological evidences has shown that as many as 20 vats (equal to 36.36%) fall close to a site frequented exclusively during the Nuragic era; 7 tanks (12.72%) are located near a pre-Nuragic site; 9 near a Nuragic site reoccupied in the Roman period and early Middle Age (16.36%).

In these conditions, we suggest that at least a part of the surveyed artefacts cannot be attributed a priori to the Roman or medieval periods. It seems that the *palmenti* were in use from at least the Bronze Age to very recent times.

Conclusion

The evidence currently available confirms that vine cultivation was a fundamental agricultural activity of Sardinia since the Early Bronze Age. The combination of botanical and biochemical analyses suggests that wine was consumed before the arrival of the Phoenicians but we are still waiting for identifying the origin of the vines (local vs. imported). Recent analyses of plaster sampled in production vats distinguish between installations used for wine or for oil.³⁰ Now, the *palmenti* can also be studied with the same methods;³¹ that will provide new data improving our knowledge of the wine culture in Sardinia.

Notes

¹ Ucchesu et al. 2015a.

² Celant 2010.

³ Cocco et al. forthcoming.

⁴ Bakels 2002.

⁵ Perra et al. forthcoming.

- ⁶ Sanges 2010.
⁷ Bakels 2002.
⁸ Sanges 2010.
⁹ Sanna 2011; Usai 2011.
¹⁰ Sabato et al. 2015.
¹¹ Sabato et al. 2015, 9.
¹² Lovicu et al. 2010; Ucchesu et al. 2015a, 2015b.
¹³ Garnier – Valamoti 2016.
¹⁴ Pecci et al. 2013b.
¹⁵ Perra et al. 2015; Garnier 2015, pers. comm.
¹⁶ Garnier – Usai forthcoming.
¹⁷ Botto 2016.
¹⁸ Botto 2016.
¹⁹ Gradoli – Garnier 2017.
²⁰ Botto – Oggiano 2012.
²¹ Pecci et al. 2013b; Pecci – Cau unpublished report.
²² Pecci et al. 2017.
²³ Loi 2017.
²⁴ Badas 1995.
²⁵ Ugas 1999.
²⁶ Van Dommelen et al. 2010.
²⁷ Satta 1996.
²⁸ Lo Schiavo – Sanges 1996.
²⁹ Sanciu 1997.
³⁰ Pecci 2007; Pecci et al. 2013a, 2013b; Garnier – Valamoti 2016.
³¹ Esteve Gracia et al. 2018; see other articles in this volume.

Image Credits

Fig. 1. 3: by the authors. – Fig. 2: 1.–4. by the authors; 5. drawn and elaborated by A. Gallo; 6. by C. Bulla.

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