
# Methods in Ancient Wine Archaeology

## SCIENTIFIC APPROACHES IN ROMAN CONTEXTS

Edited by Emlyn Dodd & Dimitri Van Limbergen

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# METHODS IN ANCIENT WINE ARCHAEOLOGY

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# CHAPTER 9
# GRAPES UNDER THE LENS: A METHODOLOGICAL APPROACH TO THE STUDY OF A SEED ASSEMBLAGE FROM VILLAMAGNA (URBISAGLIA, ITALY)

*Riccardo Carmenati, Francesco Breglia, Girolamo Fiorentino and Roberto Perna*

## Abstract

Villamagna, a Roman villa in the countryside of Urbisaglia, in the Marche region of Central Italy, housed important *gentes* of the nearby colony of *Pollentia-Urbs Salvia*, such as the *Herenni*, some of whom were active in the wine trade. A rich carpological assemblage, dating between Late Antiquity and the early Middle Ages, was collected from the site. *Vitis vinifera* was the most recurring *taxon*, highlighting the importance of grape exploitation in this production context. A morphometric approach was taken on 163 grape pips from two contexts to shed light on morphological variability through Principal Component Analysis (PCA). Biometric analyses were also applied to better understand archaeobotanical significance and, for most of the analysed pips, the indices fell within the wild subspecies range. This preliminary data allows us to formulate more specific questions about viticulture in this period, especially concerning wild and domestic grapevine exploitation and its historical significance.

## Introduction

The study of historical, ceramic and epigraphic documentation related to Roman viticulture has shed light on the economic and cultural importance of wine and the vine. However, many questions remain concerning the spread of grapevine cultivation and harvesting systems, recognition of ancient cultivars, and the selection of cultivars to territorial scale. Archaeobotany, although still young as a discipline, is well equipped to respond to these questions. Villas and farmsteads provide recognizable and articulated rural production centres in the Roman world and were often located in the heart of the landscape. They are of fundamental importance for investigating these questions. One such site forms the object of the present case study. The Roman villa of Villamagna in Urbisaglia was an important agricultural centre and has yielded ceramic and epigraphic remains suggesting connections to the wine trade. During the most recent excavation

campaigns, thorough sampling to collect archaeobotanical remains was conducted. The site and our methodology provide a case study, which, if properly implemented on a larger scale, could begin to answer broad questions regarding our understanding of Roman viticulture.

## The archaeological context

Located near Urbisaglia in the central Marche (Figure 9.1), the structures at Villamagna lay within the territory of the colony of *Pollentia-Urbs Salvia*, 1.5 kilometres to the northeast. The villa itself was inhabited for over six centuries, but the broader area continued to be populated until the fifteenth century. Although the perimeter has been almost completely identified, some parts of the villa – which covers more than 7,000 square metres – remain to be investigated.[1]

In the Roman era, from the first century BCE to the fifth century CE, the villa was inhabited by notable families from the nearby colony. Numerous stamped bricks with inscriptions attest to the presence of members of the *gens Herennia* and it is possible that a family with political influence from the town decided to base their economic power, production and commercial activities in the villa. There is an analogy between the *bullae*

**Figure 9.1** Aerial image of the Villamagna plateau and archaeological area. Photograph by authors.

[1]Paci and Perna 2016.

of the *Herenni* of *Urbs Salvia* and those of the *Marci Herenni Picens*, renowned wine merchants and producers of *amphorae*.[2] The similarities may reveal the involvement of the *Herenni* of *Pollentia-Urbs Salvia* in the production and commerce of wine, as well as links, perhaps including family ties, with the *Marci Herenni*.

The structure at Villamagna is delimited by a perimeter wall and is divided into sections: a *pars urbana*, the main residential area, and *pars rustica*, the working or production areas. The former is made up of a day area with rooms for receiving guests (two of which have apses), a courtyard and a *portico atrium* with pillars. To the southwest of this area is a large open space, perhaps an orchard or vegetable garden. Of the *pars rustica*, a large space for production and storage that is divided into three naves by pillars has been investigated (Figure 9.2a). In the southern part, there is a complex of underground rooms, among which is a vaulted cellar and a square room; to the west is a space in which the paving in *opus spicatum* suggests the presence of presses; and in the northern part, a cistern and a well.

Inside the excavated production and storage space of the *pars rustica*, a basin is built of *opus spicatum* on the south side and a series of four more adjacent basins, lined with *opus signinum*, are located on the east side. Both structures have a large *dolium defossum* on one of their short sides. Such an association suggests a sequential process that entailed the joint use of the basins and *dolia*. The north side of the space is characterized by at least two rows of *dolia*, while in the west corner and central area are large pits filled with dumped building materials, dated between the fifth and sixth centuries CE. Near the central pit, excavations located a structure for combustion, perhaps a kiln from the mid-fifth century CE. Before its abandonment, the area was used for funerary purposes with nine burials found.

## Materials

During the 2018 excavation season, 2,885 carpological finds were recovered, of which the majority belong to *Vitis vinifera* (2,248 or 78 per cent). All the pips were charred and found in several contexts.

Found next to the *dolium defossum* near the *opus spicatum* basin – attributable, however, to a phase of structural abandonment – was a layer (SU 176) that yielded 1,823 grape pips, many of which were fragmented (Figure 9.2c). Additionally, at the bottom of the largest of the four linear basins lay a two-handled vessel with a spout, in which was a sediment (SU 145) containing more grape pips, together with the flesh and seeds of other fruits (Pomoideae, *Ficus carica* and other species not yet identified). Also dated to the abandonment phase is a small layer (SU 4012) that yielded 223 mostly intact grape pips (Figure 9.2b). Contemporary with its use as a burial area, the filling of Tomb 8 (SU

[2]Marengo 2002.

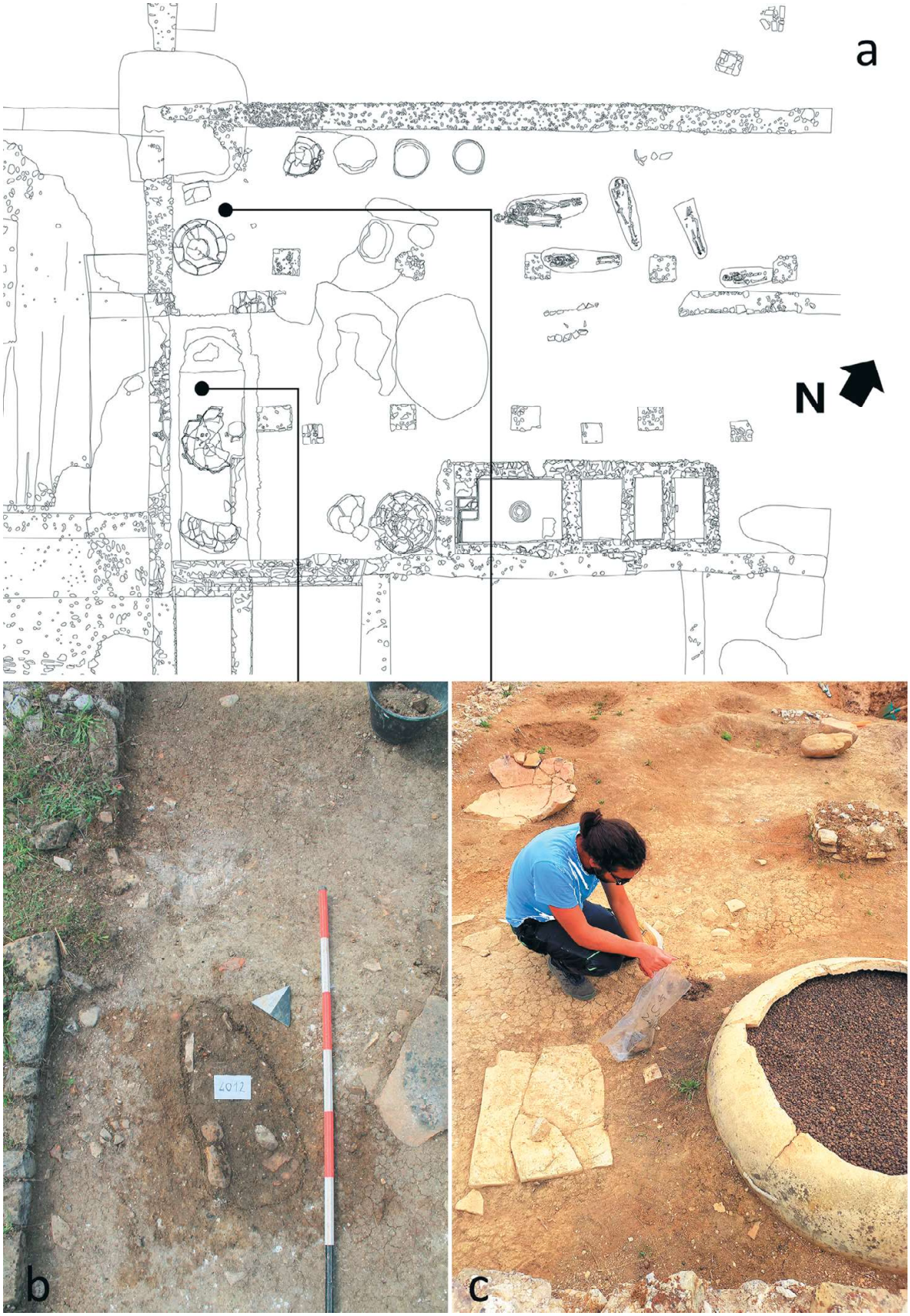


**Figure 9.2** (a) plan of the Villamagna *pars rustica* with sampling points indicated by the black dots; (b) SU 4012; (c) sampling SU 176 during excavation. Photographs and plan by authors.

4001) delivered fifty intact grape pips, perhaps linked to ritual offerings of food or purely by chance.[3] Finally, one of the preparatory levels (SU 4163) of the combustion structure was composed of over 2,000 mostly intact grape pips, along with olive stones and fragments of walnut. Excavations of the *pars urbana*, recovered grape pips in sediments datable to the destruction phase (SU 1034) and to the reuse phase (SU 1031). From the latter came a charred grape, almost intact, with at least two pips inside.

A sub-sample of ninety-seven pips from SU 176 and another of sixty-six from SU 4012 were taken for biometric and morpho-geometric analyses (Figure 9.3a). The two stratigraphic

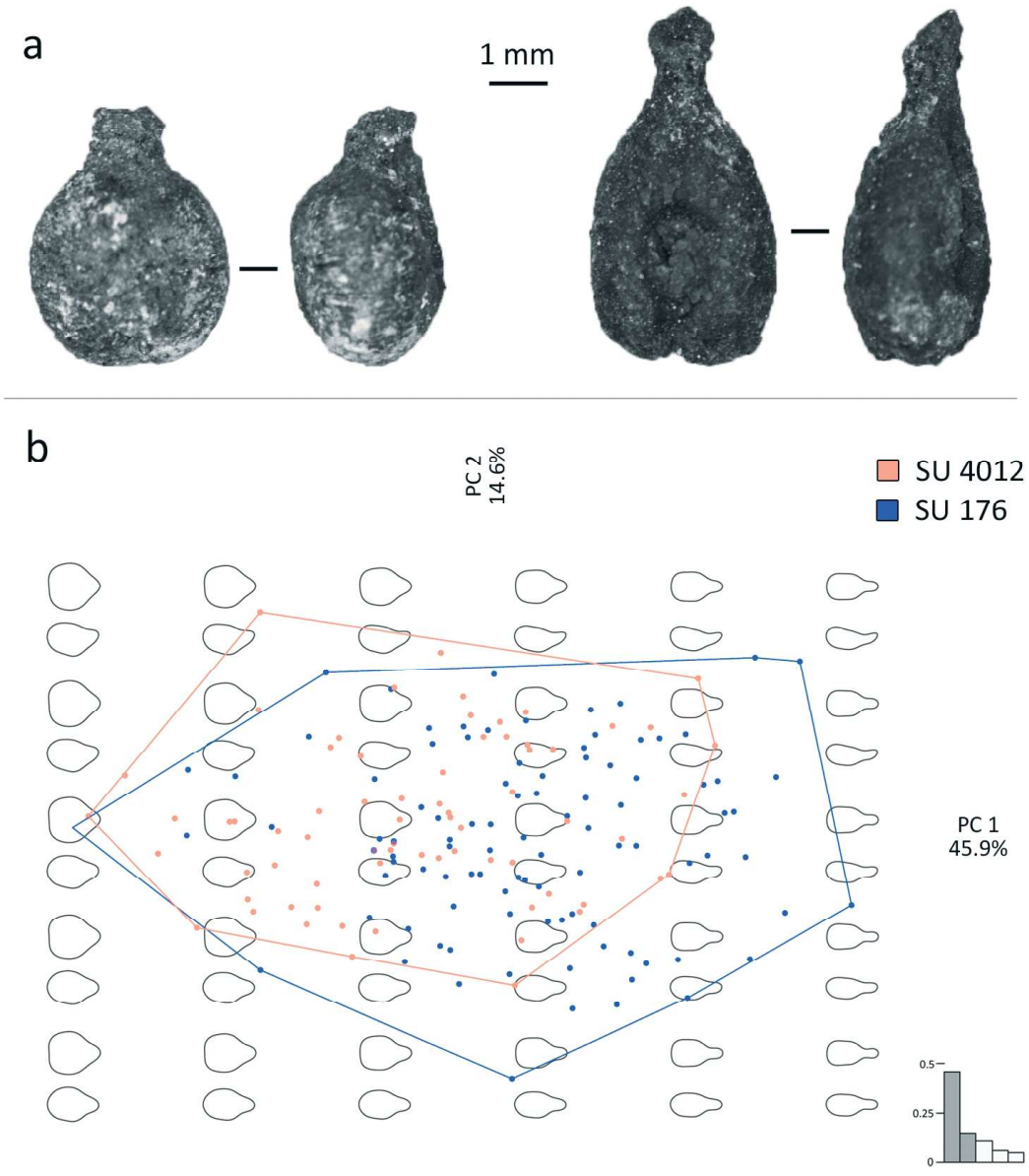


**Figure 9.3** (a) example of the sample's inner variability which illustrates wild (*left*) and more domesticated (*right*) morphotypes; (b) PCA plot for SU 176 and SU 4012 grape pips. Photographs and diagram by authors.

[3]Carmenati, Fiorentino and Perna 2019.

**Table 9.1 Radiocarbon dating performed on grape pips of SU 176 and SU 4012**

| *Sample ID* | *Stratigraphic Unit* | *Radiocarbon Age (BP)* | *δ13C (‰)* | *Calibrated date (2σ)* |
|---|---|---|---|---|
| LTL21925 | 176 | 1440 ± 45 | -25.9 ± 0.5 | 555 CE / 661 CE (95.4%) |
| LTL21921 | 4012 | 1609 ± 45 | -28.1 ± 0.4 | 375 CE / 569 CE (95.4%) |

units were dated by direct radiocarbon dating on grape pips, determining a chronological range between Late Antiquity and the beginning of the Middle Ages (Table 1). The samples were dated at CEDAD (Centro di Datazione e Diagnostica of the University of Salento), using high-resolution mass spectrometry (AMS) and calibrated to calendar age using the OxCal software Ver. 3.10 based on INTCAL20 atmospheric data.

## Methods

### *Morphometric and statistical analyses*

Morphometric analyses, based on outline acquisition using the Elliptic Fourier Transform method, were performed on all 163 selected grape pips, following the method developed in recent decades by researchers at the Institut des Sciences de l'Évolution de Montpellier (ISEM).[4] Each seed was photographed in dorsal and lateral view, and the images were subsequently semi-automatically processed as to obtain a black shape on a white background. The files were then imported into the R software environment, where they were processed using Momocs and MASS statistical packages for morphometrics analyses.[5] The coordinates of 360 equidistant points were automatically extracted from each outline by the software, then centred and aligned. Following a consolidated practice for this type of analysis, six harmonics were considered for the description of the profile.[6] In this way, forty-eight coefficients per seed (twenty-four for the dorsal view and twenty-four for the lateral view) were obtained and used as quantitative variables describing the geometry of the pip. These coefficients are also used in PCA, which makes it possible to visualize the internal variability of the sample and to compare assemblages from distinct contexts, chronology and sites. In this case, the two stratigraphic units were compared.

### *Biometric analyses*

The same sample of grape pips from SU 176 also underwent biometric analysis to understand whether they were wild or domesticated morphotypes. Specifically, we

[4]Terral et al. 2010; Pagnoux et al. 2015, 2021; Bonhomme et al. 2020; Bouby et al. 2021; Roushannafas, Bogaard and Charles 2022.
[5]Venable and Ripley 2002; Bonhomme et al. 2014.
[6]Terral et al. 2010.

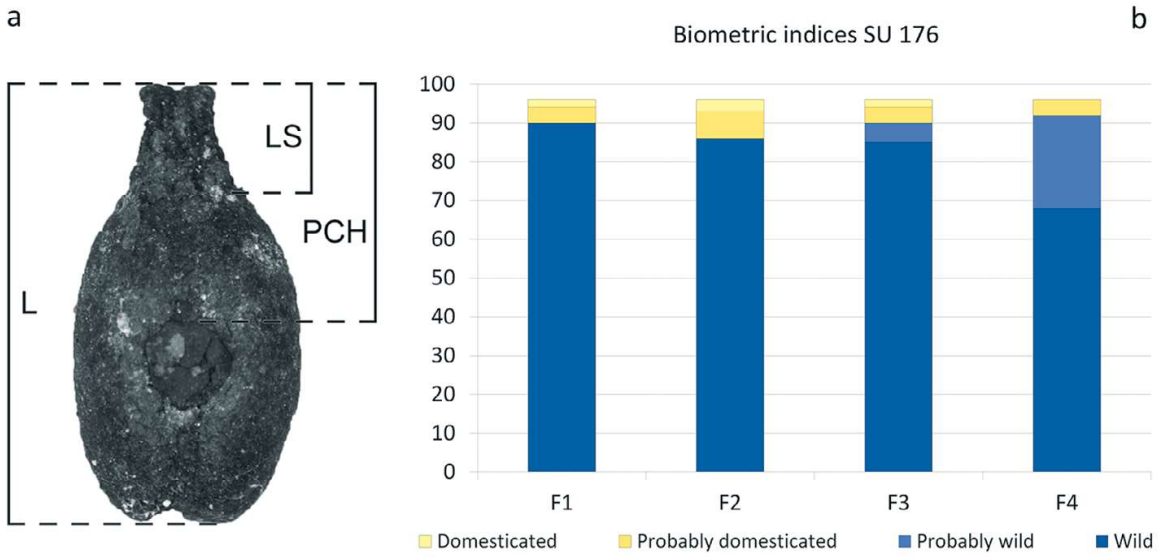


**Figure 9.4** (a) anatomical measurements of the grape pip to obtain biometric indices developed by Mangafa and Kotsakis (L: total length; LS: length of stalk; PCH: placement of chalaza); (b) biometric analysis results of grape pips from SU 176. Photograph and diagram by authors.

applied a method that has been shown to be particularly effective at distinguishing wild from domesticated charred grape pips.[7] This is based on the relationship between the measurements of certain anatomical characteristics of the seeds, all along the same axis (Figure 9.4a), thereby minimizing the deformation effects resulting from charring, which acts unevenly on various axes. The measurements make it possible to obtain biometric indices which, when inserted in four mathematical formulae, provide a result that falls within one of the four ranges envisaged by the authors: wild, probably wild, probably domesticated, and domesticated.[8]

## Results

The PCA performed on the morphology of the grape pips from SU 4012 and SU 176 highlighted the broadly homogeneous character of the sample: the PC1-PC2 biplot (60.2 per cent total variance) shows the overlap of the two clusters (Figure 9.3b). There is, however, a slight difference between the two assemblages. The morphological characteristics of the grape pips from SU 4012 are shifted slightly towards wild morphotypes, with rounded forms and short stubby stalks (Figure 9.3b, top left). A larger number of seeds from SU 176 show a morphology more alike domesticated types, with an elongated shape and long stalks (Figure 9.3b, bottom right). Both clusters show unimodal distribution of the respective populations, with peaks corresponding to morphotypes with intermediate characteristics.

[7]Developed by Mangafa and Kotsakis 1996.
[8]Mangafa and Kotsakis 1996.

In order to further investigate this substantial similarity, biometric analyses were performed on the pips from SU 176 (i.e. those with the more domesticated morphotype). The results show that almost all the pips – from sixty-eight to ninety, depending on the formula used – fall within the wild range, while zero to twenty-four grape pips fall within the probably wild range (Figure 9.4b). A small number of grape pips – from four to seven – fall within the probably domesticated range, while a negligible quantity – from zero to three – fall within the domesticated range.

## Discussion

Considering the chronology and the characteristics of the contexts from which the analysed grape pips were recovered, the results above may appear rather surprising. Indeed, in Late Antiquity viticulture was widely practised in Italy, and there is significant archaeological evidence of its economic importance at the site of Villamagna. The almost exclusive presence of wild morphotypes among the grape pips analysed thus raises a series of questions. Were local wild grape varieties used? Or is this evidence of a particular cultivar with seeds that do not bear the typical morphological characteristics of current domesticated varieties?

While a high percentage of the grape pips analysed are attributable to wild morphotypes (72 to 94 per cent), it is unlikely that the economic activities performed at this site were reliant upon intensive wild grape gathering, especially considering that the villa was almost certainly set up as a rural production centre. The possibility that the morphotypes illustrated were composed of feral forms (domesticated types that have been 're-wilded') should not be dismissed. The two stratigraphic units from which the analysed specimens were sampled are datable from the late fourth to the mid-seventh centuries CE. Throughout peninsular Italy, this period was characterized by pronounced geo-political instability, as well as general economic and demographic decline.[9] These problems were compounded by the violence associated with the Gothic War and its aftermath and by the so-called Plague of Justinian in the mid-sixth century.[10] Given this socio-political and economic context, perhaps the management of agricultural activities was neglected and sporadic, causing the vineyards to revert to a natural or feral state (see above) in a relatively brief timespan. This may have caused a reduction of fruit productivity and quality in the absence of human care.[11] That the specific contexts in which the grape pips were sampled are interpreted as the result of abandonment – or disuse – of the villa's production structures might support this argument.

It should also be considered that, although viticulture was widely practiced in the Roman period, previous studies suggest that selective pressure on crops in antiquity was

[9]Barzanò 2018.
[10]Fabrini 2000; Ravegnani 2004; Perna 2006.
[11]cf. Grassi and De Lorenzis 2021.

lower than that visible in current domesticated varieties.[12] This is perhaps due to the constant recourse in ancient cultivation to plants arising from sexual reproduction, while modern grape cultivation is mainly based on vegetative propagation.[13] This might lead to the combined presence of wild, intermediate and domesticated morphotypes subject to moderate selection. We must also consider the possibility that the vines cultivated around Villamagna were of a cultivar characterized by small berries, whose seeds may resemble the characteristic wild morphotype despite being of a domesticated species,[14] as is indeed the case with some modern vines.

The questions raised by the preliminary results of this study cannot yet be answered with certainty. They do, however, indicate a crucial research pathway dependent upon high-quality archaeobotanical sampling and study regimes that can ultimately lead towards a better understanding of viticulture in the Roman period and antiquity more broadly. The potential and reliability of morphometric and biometric studies is constantly enhanced by increasing numbers of samples and sites. We must continue to extend this method of enquiry, both temporally and geographically, to archaeologically identify distinct cultivars and regions of production in the sphere of Roman viticulture.

[12]Bouby et al. 2013.
[13]Bouby et al. 2013.
[14]Bonhomme et al. 2020.