Methods in Ancient Wine Archaeology

SCIENTIFIC APPROACHES IN ROMAN CONTEXTS

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CHAPTER 8

APPLICABILITY AND USE OF ARCHAEOBOTANY FOR THE STUDY OF VINE CULTIVATION AND WINEMAKING IN THE ROMAN PERIOD

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Abstract

This contribution presents a synthesis of the archaeobotanical studies of vine remains (pollen grains, woods, charcoals, seeds, fruits and other botanical material) in northern Italy during the Roman period. Carpological remains are among the most important pieces of evidence because they often make it possible to distinguish between cultivated and wild grapevines, while the presence of grape pomace is highly suggestive of the presence of winemaking processes. Remains of grape pomace are documented at numerous sites across northern Italy and the high presence of pollen grains and xylo-anthracological as well as carpological remains testifies to the grapevine's widespread presence in the Po Valley and neighbouring hilly areas.

Introduction

In Italy, the grapevine (*Vitis vinifera* L.) is present with two subspecies: *Vitis vinifera* L. ssp. *sylvestris* (c.c. Gmelin) Hegi (wild grapevine) and *Vitis vinifera* L. ssp. *Vinifera* (cultivated grapevine). As a synonym for the cultivated form, the name *Vitis vinifera* L. ssp. *sativa* Hegi is also commonly used.[1] Despite abundant archaeological, archaeobotanical, historical and genetic data, the origins, historical biogeography, identity of ancient grapevine cultivars, and mechanisms of domestication are still debated. This chapter presents a synthesis of the archaeobotanical data on grapevine finds in northern Italy during the Roman period. It focuses on the use of these studies to document the cultivation and transformation of grapes into wine through winemaking processes.

The cultivation and domestication of the grapevine are now widely accepted to have occurred between the seventh and the fourth millennium BCE in the hygrophilous

[1]Webb 1968; Pignatti 2017–19.

forests located between the southern coast of the Caspian Sea and the eastern coast of the Black Sea.[2] Cultivated forms would have been spread via human agency through the Near East, Middle East and Central Europe (see Chapter 2). In northern Italy, archaeobotanical data shows that during the Neolithic and Early Bronze Age a range of knowledge concerning the harvesting and use of grapevine fruit had already been acquired or developed. During the Middle and Late Bronze Age, the spread of grapevine cultivation appears to have intensified, although it is not clear whether this was due to technologies directly or partly acquired from earlier contacts with the Mycenaean world or with the Greek world at a later stage. Based on current data, it is more plausible to think that an evolution of spontaneous Italian vines from indigenous populations was accompanied by the introduction of allochthonous vines from areas where viticulture had already been established for some time (e.g. the eastern Mediterranean basin, where viticulture was already practiced with a relatively high level of technology). The period critical to the spread of grapevine cultivation lies between the Bronze and Iron Ages, after which viticulture became an established activity.[3] Such conclusions are further supported by chemical analyses carried out on ceramic vessels found at some Middle Bronze Age sites, in which the presence of tartaric acid, a fundamental component of wine, is documented.[4]

Materials and methods

In this study, pollen grains, xylo-anthracological and carpological grapevine finds from various Roman sites in northern Italy were considered to investigate how archaeobotanical evidence can contribute to our understanding of the transformation of grapes into wine through vinicultural processes.

The different types of grapevine finds in the archaeobotanical field play an invaluable role in archaeological research but, from a methodological point of view, the identification of cultivated vines is somewhat problematic and discrimination between *Vitis vinifera* L. ssp. *sylvestris* and *Vitis vinifera* L. ssp. *vinifera* is not always possible. Understanding when grapes were used to produce wine is even more complex, since this can only be inferred based on the type of assemblage of material found (e.g. grape pomace) and the archaeological context in which it was found (e.g. wine presses, production facilities or *amphorae*). The congenital characteristics of the vine – a plant that produces relatively limited quantities of pollen – also must be taken into consideration (see Figure 8.1 for an example of grapevine pollen). Subspecies identification through grapevine pollen grain

[2]For more discussion on the origins of cultivation, domestication and wine production, see the contributions by Dodd and Van Limbergen and McGovern in this volume as well as McGovern and Rudolph 1996; Zohary and Hopf 2000.
[3]Marchesini et al. 2021.
[4]Pecci et al. 2020; Borgna et al. 2022.

is also somewhat problematic and this field is still developing.[5] It is only possible to reach an indirect discrimination between wild and cultivated grapevine when pollen quantities are sufficiently recovered from suitable archaeological contexts.[6] Finally, all these aspects must be correlated with the state of preservation of the materials recovered.

On the one hand, as far as trunks and shoots are concerned, it is possible to morphologically distinguish between cultivated and wild grapevines; however, the limited size of xylo-anthracological finds makes it difficult to distinguish between the two subspecies and their ability to contribute to the identification of *vinifera* subspecies is only possible in certain cases. Microscopic analysis of the wood structure, on the other hand, does not enable a clear distinction between the two types. Like pollen analysis, therefore, the presence of a quantitatively significant xylo-anthracological assemblage and a correlated archaeological context is fundamental.

Grape seeds (also called pips) are the most common proxy among macro remains and the only type that, thanks to their morpho-biometric characteristics, can partially offer a distinction between wild and cultivated subspecies. To assess these parameters, it is necessary to have a sufficiently large number of grape seeds to accurately observe variations and conduct appropriate statistical research. Studies are based on the measurement of dimensions (length, width and thickness) of the seed, length of the beak and the chalaza. Equally diagnostic are the indices and parameters of morphology, such as the germination area and the fossettes pattern.[7] Regarding size ratios, specifically the ratio of width to maximum height, grape seeds can be discriminated on the basis of the intervals established by Stummer's Index, according to which a result between 0.44 and

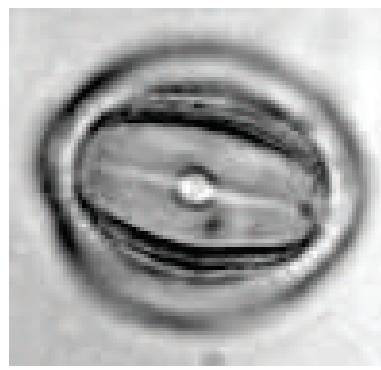

Figure 8.1 One 23 μm grapevine pollen grain. Courtesy Centro Agricoltura Ambiente Giorgio Nicoli.

[5]See contributions by Brown et al. and Van Limbergen and Gurdebeke in this volume.
[6]Marchesini et al. 2021.
[7]The distinctive ventral infolds of the grape, also known as seed folds or rumination in-growth.

0.53 would indicate a wild form, whereas a value between 0.76 and 0.83 would indicate that it is cultivated.[8] Nowadays this criterion is losing some of its original and established reliability and attempts are being made to identify new, more rigorous parameters.[9]

Results

One of the most widespread mixed forms of grapevine cultivation in northern Italy in Republican and early Imperial times was *arbustum gallicum* (Figure 8.2).[10] According to this method the grapevine was 'married' to elm, maple and horn-beam trees – a practice also attested in the Roman literary sources.[11] From an archaeobotanical perspective, the earliest evidence of *arbustum gallicum* was found in the nineteenth century during drilling work for the construction of several artesian wells. Elm stumps married to vines

Figure 8.2 Grapevine training using the system of *Arbustum gallicum*. Courtesy Centro Agricoltura Ambiente Giorgio Nicoli.

[8]Stummer 1911.
[9]cf. Mangafa and Kotsakis 1996; Perret 1997; Castelletti et al. 1998; Milanesi et al. 2011; Terral et al. 2010.
[10]Sereni 1964; Forni 1996; Van Limbergen et al. 2017; Van Limbergen 2020b.
[11]E.g., Columella, *Rust*. 3.2.17-24, 5.6.5, 5.6.24, 5.7.1; Pliny, *HN* 14.3.34, 17.35.199-203, 14.4.31, 14.4.22, 17.15.78; Varro, *Rust*. 1.7.2; Virgil, *G*. 2.217-21, 2.277-78.

were recovered between 10–15 metres deep during the excavation of a well near the parish church of S. Biagio del Carmine and in the courtyard of a private house in Via del Muro in Modena.[12] Numerous archaeobotanical studies relating to the xylological finds from the storage pits in Cognento (Modena),[13] Rubiera (Reggio Emilia)[14] and Badia Polesine (Rovigo)[15] indicated the presence of grapevine, maple and elm branches in the levels dated archaeologically to the late sixth and early seventh centuries CE. This supports a hypothesis of vine cultivation using *arbustum gallicum* nearby the pits. Moreover, the presence of charred remains of grapevines, maple and elm trees indicates the use of *arbustum gallicum* as a source of firewood.

In the Roman villa of Casteldebole (Bologna), from a pit datable to the second to third centuries CE, the remains of grape pomace consisting of a total 7,339 grape seeds, skins, berries and pedicels were recovered, documenting winemaking processes in some tanks found in the villa's production area.[16] In a well in Via Don Dossetti at Sant'Agata Bolognese (Bologna) in levels dated to the first century CE, numerous grape seeds and some perfectly preserved charred grapes were found (Figure 8.3). The presence of a press (*torcular*) (Figure 8.4) and numerous *dolia* suggest that one of the settlement's main agricultural activities was related to wine production.[17] Grape seeds and charred grapes were recovered at the Imperial-era villa of Mercatello in Castello di Serravalle (Bologna). The large quantity of grape seeds found near a hearth here could be interpreted as a

Figure 8.3 Charred grape (14 millimetres) found in a well at Via Don Dossetti in Sant'Agata Bolognese, Italy. Courtesy Centro Agricoltura Ambiente Giorgio Nicoli.

[12]Mazzetti 1892; Malavolti 1948; Forni 1996.
[13]Accorsi et al. 1998; Marchesini and Forlani 2002.
[14]Marchesini et al. 1998.
[15]Malaguti et al. 2011.
[16]Bandini Mazzanti et al. 1995; Marchesini 1998.
[17]Trocchi et al. 2014.

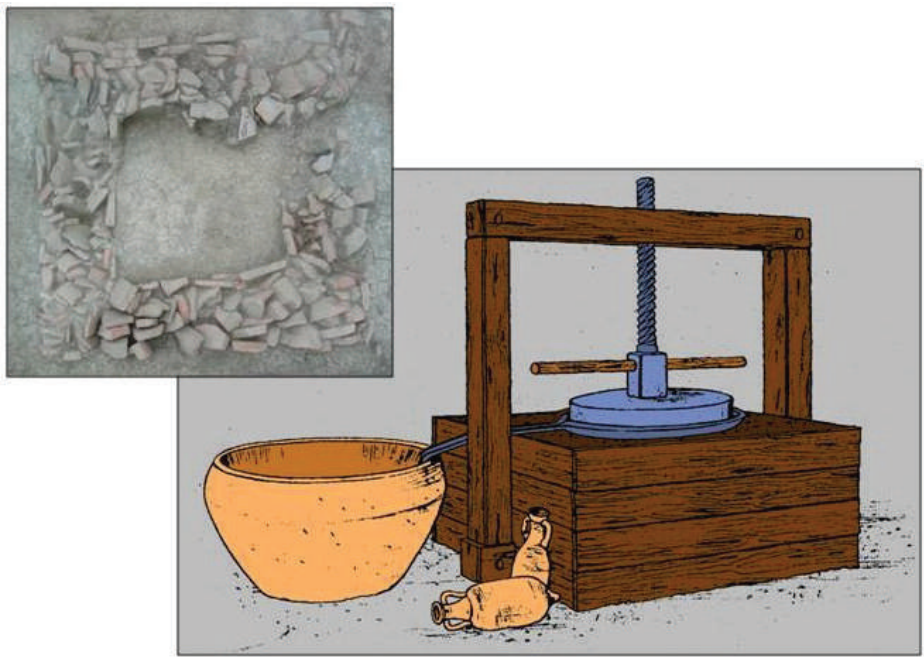

Figure 8.4 Foundation remains and reconstruction of the *torcular* found at Via Don Dossetti in Sant'Agata Bolognese, Italy. Courtesy Centro Agricoltura Ambiente Giorgio Nicoli.

secondary use of the grape pomace after pressing, dried and burnt as fuel, according to similar practices attested traditionally in many viticultural regions in later centuries.[18] Pollen grains, charcoal and grape seeds were also found at the villa of Domagnano in the Republic of San Marino. Here, the transformation of grapes into wine is evidenced by a tank and a press base.[19]

The spread of Roman viticulture throughout the Po Valley is supported by archaeobotanical material, especially grape seeds, at various sites in the Veneto region. At the villa of Marina di Lugugnana in Portogruaro (Venezia), dated to the end of the first century BCE and the beginning of the first century CE, grape seeds in sufficient quantities for the production of one hectolitre of wine were recovered inside a tank and press rooms.[20] In the filling of a well at Badia Polesine (Rovigo), from the late Imperial age, several hundred grape seeds, pedicels, fragments of vine shoots and pollen were found (Figure 8.5), which, in addition to testifying to the cultivation of vines, could also suggest the production of wine.[21] In the excavation of the Roman villa at Negrar (Verona), a region still dedicated to viniculture today, grape seeds and charred trunks (Figure 8.6)

[18]Badiali 2012.
[19]Mercuri et al. 2009.
[20]Di Filippo Balestrazzi 2004.
[21]Malaguti et al. 2011.

Figure 8.5 Grape seeds found in the well at Badia Polesine, Italy. Courtesy Centro Agricoltura Ambiente Giorgio Nicoli.

were found supported by quantities of pollen high enough to attest productive continuity from the Roman era onwards.[22] Excavations conducted at the beginning of the 1960s in the Venetian lagoon on the island of Torcello (Venezia) brought to light numerous macro remains including a large quantity of grape seeds of different types, pedicels and shoots in levels dated to Late Antiquity.[23] The discovery of bundles of vine shoots arranged horizontally to protect the soil from sea erosion is particularly noteworthy.[24]

Intensive vine cultivation is also documented in the Trentino region, as demonstrated by the discovery at the bottom of a well dating to the third to fourth centuries CE in Nago (Trento), of more than 9,000 grape seeds mixed with potential fragments of grape pomace and shoots.[25] Inside rooms interpreted as a kitchen or storage space of the first/second to fifth/seventh centuries CE at an agricultural building in Mezzacorona (Trento), more than 200 grape seeds and charred wooden remains of pruned vines were recovered, suggesting cultivation of grapevines nearby and wine production.[26]

At Genoa, in the Ligurian region, a grape seed and pedicel were found in a cabinet containing votive offerings from levels dating to the late second to early first century

[22]See Basso and Dobreva in this volume.
[23]Marcello 1965.
[24]Manzoni 1965.
[25]Ciurletti 1996.
[26]Castiglioni and Rottoli 1994.

Figure 8.6 Charred grapevine shoot fragments (*right*) and light microscope section of *Vitis vinifera* (viewed at 25x, *left*) from the villa in Negrar, Italy. Courtesy Centro Agricoltura Ambiente Giorgio Nicoli.

BCE.[27] More exceptionally, however, was the presence of whole bunches of charred grapes inside an *amphora*, found in destruction layers. In total, there were between 24–28 bunches, with each consisting of 150–200 grapes. The original volume occupied by the grapes was about six litres. Also in Liguria, material from a shipwreck in the Dianese Gulf allowed for analysis of resins inside containers (*dolium* and *doliolum*), which revealed clear traces of *Vitis* pollen (18.4 per cent), providing strong indications for their contents to be wine.[28]

Significant percentages of vine pollen are present in archaeological levels at the Roman city of Aquileia (Udine), particularly in the layers of the harbour and western forum. This, combined with the presence of numerous grape seeds, suggests the cultivation of vines and probable transformation of grapes into wine.[29]

Conclusion

In Italy during the Roman period, grapevine remains have currently been recovered from around seventy sites, at least forty-five of which are in northern Italy. In the Po

[27]Castelletti et al. 1996.
[28]Arobba et al. 1999.
[29]Cottica et al. 2017.

Valley during this period there was a progressive colonization of the territory, which is particularly evident in the region around Emilia Romagna where vines were found at over twenty-five sites. The most widespread method of cultivation was the *arbustum gallicum* supported traditionally by Roman agricultural literature but now also by numerous archaeobotanical findings.[30]

Studies that have synthesized material across multiple sites indicate vine pollen at significant percentages in several samples from nine sites on the Bologna plain and from structures of different types (villas, rural buildings, anthropic levels, necropoleis) ranging from the first century BCE to the fifth century CE.[31] Such widespread presence of grape pollen cannot only be due to the use of grapes as fruit but must be linked to some scale of vinicultural industry and wine production – a theory supported by the discovery of grape pomace at the *villa rustica* at Casteldebole, in tanks used for winemaking at the villa of Marina in Portogruaro, and the well of Nago in Trentino. It is further confirmed by the discovery of numerous structures and facilities directly related to wine production (e.g. presses, tanks/vats and cellars) and by reference to viticulture in this region in classical literature. Within this broad multidisciplinary scope, however, the contribution of archaeobotany to research into winemaking is clearly fundamental and, in particular, the continuous presence of grapevine pollen at almost all the sites investigated provides an indication of just how widespread cultivation was in Roman northern Italy.[32]

[30]Bosi et al. 2020.
[31]Marchesini 1998; Marchesini and Marvelli 2010, 2017.
[32]Lodwick and Rowan 2022.