

Pompeii: Seeds and fruits from workshop VII 14, 3

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ABSTRACT

This paper presents a study of carpological remains discovered at Pompeii (VII 14, 3) during archaeological investigations conducted by the University of Genoa. Samples were collected from contexts spanning from the late 3rd century BC to 79 AD. During this time-frame, the area underwent numerous transformations, serving consecutively as an open space with latrines, a disposal site for domestic waste, a location for craft workshops, and ultimately hosting a workshop.

Except for a few samples preserved for future analysis, sediments from the contexts examined underwent thorough water-sieving on a declining-mesh sieve column and simultaneous flotation. The material examined comes from 60 samples (15 obtained via visual inspection and 45 by means of flotation) relating to 29 stratigraphic units, totalling approximately 2.2 m³ of soil.

Given the sealed and undisturbed nature of these contexts, the consistent composition of accumulations derived from faeces and food remains, in both the older and newer latrines and the refuse dump, suggests a continuity in dietary choices lasting several centuries, despite the evolving use of the area.

Carpological remains provide minimal evidence of natural environments or other anthropized contexts, highlighting the cleanliness and orderliness of the area occupied by latrines and the refuse dump, which functioned as a well-maintained courtyard.

The collective data suggest that this part of the city was already fully urbanized by the 2nd century BC. Stratigraphic evidence indicates continued activity even after the foundation of the Roman colony, portraying a diverse consumption pattern including various major cereals (*Hordeum* and *Triticum* spp.), along with millet and foxtail millet, some legumes, other vegetables, and abundant fruits.

1. Introduction

The study of plant remains in Pompeii has mainly focused on the workshops, *domus* and their gardens destroyed by the eruption of AD 79. Initiated with the intention of cataloguing and conserving in museums materials from old excavations (Borgogino, 2006; Meyer, 1980, 1988, 1994), more recent archaeobotanical studies have considered all archaeological-historical aspects. In parallel, studies of the extensive iconography of the frescoes and decorations have been carried out, especially with a view to reconstructing gardens, orchards, and agronomic techniques (Ciarallo, 2000; Ciarallo and Lippi, 1993; Jashemski, 1963, 1973, 1974, 1977, 1979, 1986, 1992, 2002, 2007; Jashemski et al., 2002). During recent excavations, several research groups have been able to analyse other contexts, both urban (Robinson, 1999; Ciaraldi and Richardson, 2000) and extra-urban (particularly graveyards, Mattered and Derreumaux, 2008; Zech-Mattered and Derreumaux,

2013), while pollen analyses have attempted to reconstruct the environment in areas surrounding Pompeii (Vignola et al., 2022). Greater attention has often been paid to extraordinary finds of exotic species (Celant and Fiorentino, 2017; Barone Lumaga et al., 2020) or special contexts (Robinson, 2002), while more ordinary situations have only occasionally received proper attention. In some cases, thanks to the lack of the floors from the last urban phase, it was possible to investigate the layers underlying the levels destroyed by the AD 79 eruption., which allowed us to study the living conditions of the town before the foundation of the colony in 80 BC and to learn about the earliest organization of the settlement and the food consumption of the population (Ciaraldi, 2007; Robinson, 1999; Murphy et al., 2013). The present work, which considers remains from latrines and garbage accumulations in *Insula XIV* of *Regio VII* of Pompeii that can be framed between the late 3rd century BC and 1st century AD, is part of the latter line of research.

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2. The excavation

The VII 14, 3 workshop consists of a roughly rectangular area overlooking the stretch of Via dell'Abbondanza between the Forum and the Stabian Baths. Identified before 1810 (Pallecchi, 2023) and then excavated on several occasions in the 1820s and 1830s, the workshop was largely deprived of its original flooring, which consisted of simple lime mortar floors, sometimes enriched with terracotta inclusions.

The absence of the floors allowed, in the years between 2016 and 2021, the conduction of a series of stratigraphic excavation campaigns that covered the entire area, with the exception of the surviving fragments of flooring. The absence of the floors allowed, in the years between 2016 and 2021, the conduction of a series of stratigraphic excavation campaigns that covered the entire area, with the exception of the surviving fragments of flooring.

For the earliest phase, from the late 3rd century to the mid-2nd century BC, the excavation revealed the existence in the area of a small open area, a courtyard perhaps used as a kitchen garden (US 3142), of which only a portion was excavated.

Within this area, over time a number of small structures made of wood and earth were built (Fig. 1); comparisons suggest that these were probably a series of latrines (Pallecchi, 2000). These structures consisted of simple pits dug into the yellowish cinerite that constitutes the city's geological subsoil; the depths of the cuts varied – and may be estimated but not determined exactly, due to the contexts' state of preservation (latrine 1: over 0.5 m; latrine 5: over 0.8 m; latrine 6: over 0.5 m) or the impossibility of reaching the bottom, for safety reasons (latrine 2: over 1.5 m). These structures functioned largely by dispersion: the liquid waste was absorbed into the ground, while the solid waste accumulated in the pit. They were also commonly used for household waste disposal (Hobson, 2009; Hoss, 2018; Jansen, 2000).

At the end of their use, the latrines were mostly emptied of their contents and filled with draining layers with a strong sandy component. The tops of the cuts were sometimes sealed by the placement of a few horizontally laid amphorae, in some cases fixed in place with small deposits of lime mortar (Pallecchi, 2018; Pallecchi and Santoro, 2019).

Only in some cases, at the bottom of the cavities were found the remains of what appeared to be the original latrine fills, rich in organic materials, including abundant anthracological and carpological remains (Structure 1: US 3145, 3146, 3203, 3252 and last uses of the structure US 3202; Structure 2: US 3042, 3071, 3208; Structure 5: US 3174, 3187;

Structure 6: US 3196). This occurred in the oldest structures (Structures 1 and 5), used respectively within the first and the second half of the 2nd century BC, and in structure 6, the most recent latrine.

A different situation was found in latrine 2, which had a rather deep pit; for safety reasons, this could not be completely emptied. The layers investigated inside it (US 3045, 3071), are in fact referable to its refilling after disuse, which occurred during the second half of the 2nd century BC. These layers have a sandy matrix, mixed with small lumps of lime and a fair amount of finds of various kinds, perhaps part of the original fill or, in any case, redeposited from nearby. Examination of this material, which also contains potsherds, charcoal, animal bones, and mollusc and insect remains, revealed the presence of a fair number of macroremains.

Towards the beginning of the 1st century BC, when Roman pressure became stronger and the city became a colony, the last latrine (structure 6) went out of use. The area, which was not yet covered or paved at that time, continued to be subjected to fairly intense frequentation, which is clearly evidenced by the formation of a small domestic dump deposit. This context, which probably consisted of the waste produced in nearby dwellings, gives a rather clear picture of the various activities that took place within them.

Notable components of the dump are some earthy layers containing numerous potsherds, as well as remains of bone and metal tools and abundant organic material, mostly charred (US 3101, 3104). The potsherds from this context have sharp fracture edges and often the vessels may be completely or almost completely reassembled.

During the accumulation of the dump, a small structure made of perishable materials (structure 7) was built in the area. Its function is currently uncertain. It remained in use for a rather limited time and a short section of the foundation is preserved. Within the strata related to its construction (US 3147, 3164, 3171, 3175, 3180, 3182, 3183, 3212) and also in one of those associated with its demolition (US 3162), small amounts of macroremains are attested, which are probably related to the presence and use of the landfill and which provide evidence, on a reduced scale, of its composition.

The use of the dump seems to have ended during the final years of the first century BC, when the area was probably employed for craft activities, which at the moment cannot be specified. This phase involved the setting up and use of a series of structures, including a masonry gully, inside which (US 3067) an interesting assemblage of macroremains was found, as well as pottery fragments and other miscellaneous finds. This

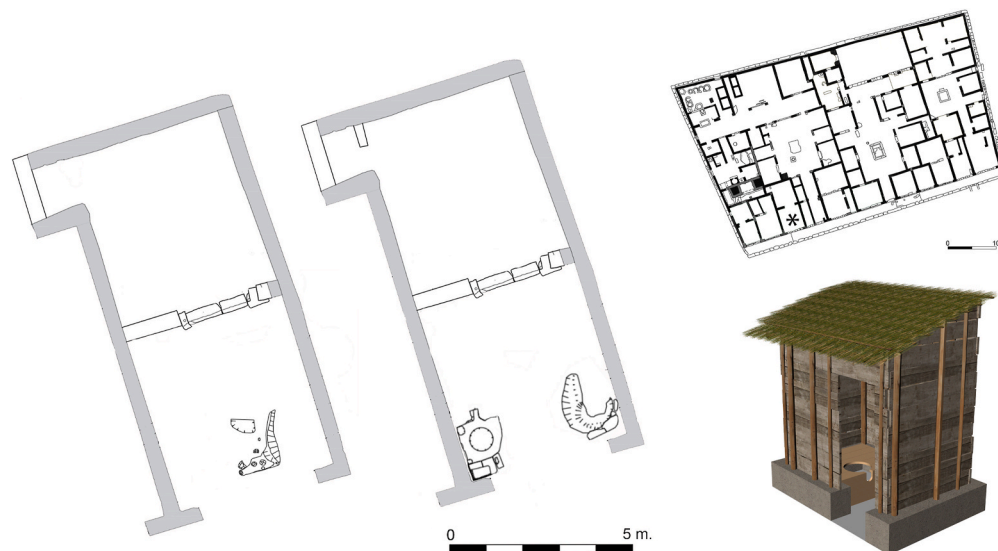


Fig. 1. The area of workshop VII 14, 3 between the late 3rd century BC and the mid-2nd century BC. On the left: remains of latrine no. 1 (late 3rd century BC – early 2nd century BC); in the center: remains of latrines no. 2 (left) and no. 6 (right): mid-2nd century BC. Top right: location of the investigated area within *Insula* VII 14; Bottom right: proposed reconstruction of latrine 1.

context was not completely sealed due to the presence of small gaps and subsidence in the overlying deposit; for this reason, it is possible that some of the items found inside it infiltrated from later stratifications.

Also related to the use of this workshop is the construction of a small rectangular basin lined with lime mortar and the erection of a pisé wall (structure 8), into the surface of which a small hole is cut, which perhaps served to hold a vertical wooden element.

The end of the use of these features, which probably remained in function until the second decade of the 1st century AD, is marked by the sudden collapse, inside the basin, of part of its wall (US 3233, 3243). The latter fragment slid vertically down the north wall of the basin and came to rest on its bottom; this circumstance clearly indicates that, at the time of the collapse of the structures, the basin must have still been in use – or at least must have been empty.

At a slightly later time, both the basin and the small hole present in the pisé wall were filled with layers of earth (US 3138, 3207, 3222), mixed with a large number of objects of various kinds, including

fragments of sometimes almost completely reconstructable crockery, animal bones and fragments of bone artefacts, as well as abundant ash and remains of charred materials. It is possible that some of these materials are somehow connected with the activities that took place inside the workshop and were burnt during the same event that led to the structural collapses and production of ash and charcoal. Toward the end of the first quarter of the century, the *insula* underwent a major structural overhaul and, through the construction of a series of *opus incertum* walls, the area under study was finally built upon and used as a workshop. The events that followed unite the history of this part of the city with that of so many other contexts already known in Pompeii; however, in our workshop, these are unfortunately evidenced only by a few fragmentary stratifications, which do not preserve macroremains.

3. Materials and methods

Sediments collected from the contexts investigated, with the

Table 1
The analyzed samples (visual/flotate and fraction screened) and the organic materials.

SU	sample	fraction sieved	Botanical remains			Zoological remains			
			charcoal	seeds/fruits	food preparations	fish scales	microfauna	malacofauna	egg shells
3138	visual	<i>in toto</i>	X						
3138	flotate	>1 mm proparte	XX	X	X	x	x	x	
3138	flotate	>1 mm proparte	XX	X	X	x	x	x	x
3138	visual	<i>in toto</i>		X					
3142	flotate	>1 mm	XX	XX	XX	x	x	x	x
3142	flotate	>2 mm	XX	X	X	x	x	x	x
3142	flotate	>2 mm	XX	X	X	x	x	x	x
3142	visual	<i>in toto</i>		X					
3142	visual	>2 mm	X	X		x			
3145	flotate	>1 mm	XX	X	X			x	
3146	flotate	<i>in toto</i>	XX	X	X	x	x	x	
3146	flotate	>1 mm	XX	X	X	x	x	x	x
3147	flotate	>1 mm	XX	X	X	x	x	x	
3162	flotate	>1 mm	XX	X	X	x	x	x	
3162	visual	<i>in toto</i>		X					
3162	flotate	<i>in toto</i>	XX	X	X	x	x	x	
3164	flotate	>1 mm	XX	X	X	x	x	x	
3171	flotate	>2 mm	XX	X	X		x	x	
3171	flotate	<i>in toto</i>	XX	X	X	x	x	x	
3174	visual	<i>in toto</i>							
3174	flotate	>1 mm proparte	XX	X	X	x	x	x	
3175	flotate	<i>in toto</i>	XX	X	X		x	x	
3180	flotate	<i>in toto</i>	XX	X	X		x	x	
3182	flotate	>1 mm	XX	X	X	x	x	x	
3183	flotate	<i>in toto</i>	XX	X	X		x	x	
3187	flotate	<i>in toto</i>	XX	X	X			x	
3196	visual	<i>in toto</i>		X					
3196	flotate	>1 mm	XX	X	X	x	x	x	x
3196	flotate	>1 mm proparte	XX	X	X	x	x	x	
3196	flotate	>1 mm proparte	XX	X	X	x	x	x	x
3196	flotate	>1 mm proparte	XX	X	X	x	x	x	x
3196	flotate	>1 mm	XX	X	X	x	x	x	x
3196	visual	<i>in toto</i>	XX	XX	X	x	x		
3202	flotate	>1 mm	XX	X	X	x	x	x	
3207	visual	<i>in toto</i>	X						
3207	flotate	>1 mm proparte	XX	X	XX	x	x	x	x
3207	flotate	>1 mm proparte	XX	X	XX	x	x	x	x
3208	flotate	>1 mm proparte	XX	XX	X	x	x	x	
3208	flotate	>1 mm	XX	XX	X	x	x	x	x
3208	visual	<i>in toto</i>		X					
3212	flotate	>1 mm	XX	XX	X	x	x	x	
3216	flotate	>1 mm	XX	X	X	x	x	x	x
3222	flotate	>1 mm	XX	XX	X	x		x	
3233	flotate	>1 mm proparte	XX	X	X	x	x	x	x
3233	visual	>2 mm	XX	X					
3233	visual	<i>in toto</i>		X					
3243	visual	>2 mm	XX	X			x		
3243	visual	<i>in toto</i>		X					
3243	flotate	>1 mm proparte	XX	X	X	x	x	x	x
3252	visual	>2 mm	X		X				
3252	flotate	>1 mm	XX	X	X	x	x	x	x

exception of a few samples that were kept for future analysis, were entirely subjected to wet-sieving on a sloping mesh sieve column, and simultaneously to flotation. The material analyzed came from 60 samples (15 selected and 45 flotation samples), pertaining to 29 stratigraphic units, totalling about 2.2 m³ of soil. Within it was a large quantity of organic finds of various kinds: abundant charcoal, numerous carpological remains and fragments of food preparations, and zoological remains of various kinds (small fragments of macro-fauna, fish scales, micro-fauna, molluscs, insects and larvae, echinoderms, egg shells, perhaps a fragment of coral). Three small pieces of thread or cord were also observed. In the laboratory, the selected samples were screened in their entirety, while the floated samples were screened variously according to their volume, with full or partial screening (see Table 1). No carpological remains or food preparations were found in three of the 60 samples (US 3145, 3222, 3101).

4. Results

4.1. Conservation

The carpological remains are charred (cereals and millets, legumes, fruits, wild plant seeds and food preparations) and mineralized (some millet grains, some fruits and a few other remains). Carbonization occurs by incomplete combustion of botanical materials, while mineralization is generally related to the presence in the sediment of saturated solutions of phosphates and carbonates, produced by the decomposition of plant and animal material, particularly fish bones (Green, 1979). Thus, the origin of the remains studied on this occasion is twofold: they consist of both kitchen waste (the burnt material) and faeces or discarded fresh material that have become mineralized inside latrines or in garbage piles. In all the samples, remains of both types were preserved in different proportions.

In many samples, plant remains were found that were neither burned nor mineralized and may be considered recent. In a few cases incomplete mineralization was observed (juniper needles, *Juniperus* sp.; hairy crabgrass caryopsis, *Digitaria sanguinalis*; yellow serradella seed, *Ornithopus* cf. *compressus*); these remains are judged to be ancient.

A total of 6284 finds were recorded, including 2946 carpological remains identified at different taxonomic levels, 230 remains that could not be precisely identified, and 3108 fragments of food preparations (Table 2, Fig. 2).

4.2. Cereals

Well-preserved cereal grains are very rare (a few caryopses of barley, *Hordeum vulgare*; naked wheat, *Triticum aestivum/durum/turgidum*; emmer, *Triticum dicoccum*; perhaps spelt, *Triticum* cf. *spelta*). Equally rare are components of the ears (rachis segments and forks, bases of spikelets and glumes, of barley, emmer and einkorn, *Triticum monococcum*).

The significance of these two types of remains is different: the presence of few spike elements indicates that the grains were hulled elsewhere almost perfectly and then brought to this area of the settlement in the form of cleaned grains. The scarcity of whole grains is due to the fact that the accumulations analyzed are excrement and waste from domestic meals and are not material pertaining to emporiums or warehouses where grains were stored and/or sold. Much more frequent are in fact fragmentary caryopses and rounded or burst grain fragments that were accidentally charred during the various types of cooking to which they were subjected (in water, steam, ovens, in vessels placed over a fire). The presence of many rounded grains suggests the preparation of polentine (puls) or similar grain-based dishes.

Caryopsis fragments cannot be precisely identified in these cases because they are too partial and deformed (out of 652 remains only 12 could be determined), but they are generically referable to the different types of wheats and barley (in Table 2: *Triticum/Hordeum*, Cerealialia, or if very small cf. Cerealialia). Quite numerous (281 in all) are the caryopses of

millets, i.e. millet (*Panicum miliaceum*, 33 caryopses) and foxtail millet (*Setaria italica*, 76 caryopses). These are also often deformed by burning and not always well determinable (in Table 2: Panicoideae and cf. Panicoideae, 172 fragments).

It is impossible to assess statistically which grains were most commonly used: emmer is recorded somewhat more consistently (it occurs in 12 out of 29 units) than barley (5 out of 29), naked wheat (3 out of 29) and the even rarer spelt and einkorn (both one out of 29). Millet is almost as frequent as emmer (11 out of 29), while foxtail millet is the most frequent cereal overall (20 out of 29). Taking fragments into account as well, however, the wheat and barley grains - although not well determined - are more abundant than millets.

4.3. Legumes and other herbaceous crop remains

Legume remains, while including a small occasional accumulation of lentils (*Lens culinaris*, Fig. 3a) in US 3196 (latrine 6), are particularly sparse (a total of 83 remains), probably for the well-known reasons of underrepresentation of legumes in contexts of this type (mineralized legume remains are difficult to determine). However, the very sparse record includes, in addition to lentil, faba beans (*Vicia faba minor*), bitter vetch (*Vicia ervilia*) and probably another edible vetch (*Vicia sativa* agg.). Other seeds - roundish, small, lacking hilum and thus more reliable diagnostic elements, may instead be field weeds and have been included among wild plants (*Vicia* sp.).

The presence of other cultivated plants is limited to a single seed of beet (*Beta vulgaris*) and very few seeds (one of which is mineralized) attributable to coriander (*Coriandrum sativum*). Some poorly preserved seeds show morphology reminiscent of flax (in Table 2: *Linum* sp.), in each case their size is too small to refer them to the cultivated species.

4.4. Fruit tree remains

These are the most abundant remains (1803, of which 1671 are determined), preserved both carbonized and mineralized. The most abundant fruit is the fig (*Ficus carica*, a total of 1150 remains, Fig. 3b), of which the achenes (the small seeds/fruits inside the sycon, i.e. what we consider the fruit, but which botanically speaking is a false fruit) have been preserved, mainly mineralized. The identification of burnt syconia is reliable when they retain whole or fragmentary achenes inside, but more complex in their absence, because it cannot be ruled out that the charred material derives instead from the fleshy parts (mesocarp) of other fruits (in Table 2: undetermined-fruit). Olive stones (*Olea europaea*, 305 remains, Fig. 3c) are also abundant but rarely whole, more often in fragments. Also frequent, but less abundant, are grape seed (*Vitis vinifera*, Fig. 3d) remains, burned and mineralized, mostly fragmentary (81 in total). Next come walnuts (*Juglans regia*, 69, Fig. 3e), hazelnuts (*Corylus avellana*, 30) and, documented by a few remains, cornelian cherry (*Cornus mas*), midland hawthorn (*Crataegus* cf. *laevigata*), pine nuts (*Pinus pinea*), almonds (*Prunus dulcis*), plums (*Prunus* cf. *domestica*), pears (*Pyrus communis*), other more uncertain Rosaceae (apples or sorbs; *Pyrus/Malus* and *Malus/Pyrus/Sorbus* type) and jujubes (*Ziziphus jujuba*). The mineralized achene attributed to a strawberry (cf. *Fragaria vesca*) may actually be a fig achene deformed by mineralization.

Apart from the strictly Mediterranean species group (fig-olive-grape), the attestation of walnut, already in late 3rd-2nd century BC contexts, and jujube (see below) is significant.

4.5. Other plants

The absence of in-situ cereal processing has resulted in an almost complete lack of weeds. Even ruderal species, which we would expect to be abundant in an area designated for waste accumulation and latrines, are particularly rare. The space around the structures was therefore kept clear of grasses and other plants and/or no mowing or waste from other preparations was thrown into the latrines. Remains are therefore few in

Table 2

Carpological remains (ch = charred; unch = uncharred; min = mineralized; fgr = fragment).

Taxa	type	ch/ unch/ min	whole/ frg	courtyard	latr1	latr1	latr1	latr1	latr5	latr5	latr5	latr2	latr6	str8	str7	str7	str7	str7	str7	dump	dump	san.	san.	str9	channel	str4	str4	str4	str9	collapse	str4	Total				
				SU 3142	3146	3202	3252	3145	3187	3174	3212	3208	3196	3222	3164	3171	3175	3180	3182	3183	3104	3101	3071	3042	3147	3067	3138	3207	3216	3162	3233	3243				
CEREALS																																				
<i>Hordeum vulgare</i>	caryopsis	ch	whole/ frg										1		1													1				3				
<i>Hordeum vulgare</i>	rachis segment	ch	frg										2																	1		3				
cf. <i>Hordeum vulgare</i>	caryopsis	ch	frg										1		1																1	3				
<i>Triticum aestivum/ durum</i>	caryopsis	ch	whole																			1					1			1		3				
<i>Triticum dicoccum</i>	caryopsis	ch	whole																							1					1	2				
<i>Triticum dicoccum</i>	spikelet	ch	frg								1											2	1				5	1	1			11				
<i>Triticum dicoccum</i>	basis	ch	frg																													2	15			
<i>Triticum monococcum</i>	glume basis spikelet	ch	frg								1	1	1								1		1	1		3	1	2	1		2	1				
<i>Triticum monococcum</i>	basis	ch	frg																									1				1				
<i>Triticum spelta type</i>	caryopsis	ch	whole																													1				
<i>Triticum sp.</i>	caryopsis	ch	frg			2											1								1						1	5				
cf. <i>Triticum sp.</i>	caryopsis	ch	frg				1																									1				
<i>Triticum/Hordeum</i>	caryopsis	ch	frg	15	4	4					5	5	7						6		3		7			7	5	3	2	4		77				
Cerealia	caryopsis	ch	frg	32	10	6	10		8	19	8	17	29						4		6	3	57	6	8	10	33	66	46	2	9	12	413			
cf. Cerealia	caryopsis	ch	frg	1			6							1						12		40	4	31			16	2	1		24	144				
<i>Panicum miliaceum</i>	caryopsis	ch	whole	1						2	2	1	3							1		4	1	3			1				3	22				
<i>Panicum miliaceum</i>	caryopsis	min	whole																												1	11				
<i>Setaria italica</i>	caryopsis	ch	whole	2	4	1		2	2	4	8	6	10						4		3	1	8	2	1	1			3	1	11	76				
Panicoideae	caryopsis	ch	frg	5	18	3	3	5		11	7	11	33	1	8						2	3	2			1	1		3	3	10	131				
Panicoideae	caryopsis	min	frg																													2				
cf. Panicoideae	caryopsis	ch	frg	2																		11					3	9	6			39				
LEGUMES AND OTHER CULTIVATED PLANTS																																				
<i>Lens culinaris</i>	seed	ch	whole										29										1							1		31				
<i>Lens culinaris</i>	seed	ch	frg										1																			1				
<i>Vicia ervilia</i>	seed	ch	whole																				1									1				
<i>Vicia faba var. minor</i>	seed	ch	whole										1																			1				
<i>Vicia faba var. minor</i>	seed	ch	frg																		6									1		8				
cf. <i>Vicia faba var. minor</i>	seed	ch	frg																									1				1				
<i>Vicia cf. sativa</i>	seed	ch	whole										1																			1				
<i>Vicia/Lens</i>	seed	ch	whole																											1		1				
Leguminosae	seed	ch	frg																		4	10	2	4	1							24				
cf. Leguminosae	seed	ch	frg	1		1																						1	4	2		14				
<i>Beta vulgaris</i>	fruit	ch	frg																									1				1				
<i>Coriandrum sativum</i>	seed	ch	frg																								2					2				
cf. <i>Coriandrum sativum</i>	seed	min	whole																			1										1				
FRUITS																																				
<i>Cornus mas</i>	stone	ch	frg	2																								2				4				
<i>Corylus avellana</i>	shell	ch	frg	1					1		2	12	1										4			1	1		6	1		30				
<i>Crataegus cf. laevigata</i>	stone	ch	frg			1																										1				
cf. <i>Fragaria vesca</i>	seed	min	whole																													1				
<i>Ficus carica</i>	syconium	ch	frg	9	6			1	1			8								2	13		1	1	3	7	2	3	1			58				
<i>Ficus carica</i>	achene	ch	whole/ frg		1	2					1	4				3		1			6	1	11	2	1	8	8		3			52				
<i>Ficus carica</i>	achene	min	whole/ frg	21	15	21		41	78	349	161	40		5	7	4	13	17	26	23		5	15	2	7	7	10	8	32	16	106	1029				
cf. <i>Ficus carica</i>	syconium	ch	frg	1					1																					9		11				

(continued on next page)

Table 2 (continued)

Taxa	type	ch/ unch/ min	whole/ frg	courtyard	latr1	latr1	latr1	latr1	latr5	latr5	latr5	latr2	latr6	str8	str7	str7	str7	str7	str7	str7	dump	dump	san.	san.	str9	channel	str4	str4	str4	str9	collapse	str4	Total				
					SU	3142	3146	3202	3252	3145	3187	3174	3212	3208	3196	3222	3164	3171	3175	3180	3182	3183	3104	3101	3071	3042	3147	3067	3138	3207	3216	3162	3233	3243			
<i>Juglans regia</i>	shell	ch	frg		1							5	10								20	7	2	9		5					3	2	64				
cf. <i>Juglans regia</i>	shell	ch	frg						1			1	2																	1		5					
<i>Olea europaea</i>	stone	ch	whole																							2	1					3					
<i>Olea europaea</i>	stone	ch	frg		16				3			3	21	96							5	6		16		12	5			2	58	41	284				
<i>Olea europaea</i>	stone	unch/ min	frg																										1		1	2					
<i>Olea europaea</i>	seed	ch	frg									2																				5					
cf. <i>Olea europaea</i>	stone	ch	frg		1									2												1	1		2	1		9					
cf. <i>Olea europaea</i>	seed	ch	frg												1															1		2					
<i>Olea europaea</i> type	seed	min	whole/ frg																							7						7					
<i>Pinus pinea</i>	shell	ch	frg									2																				2					
<i>Prunus</i> cf. <i>domestica</i>	stone	ch	frg								1																					1					
<i>Prunus</i> sp.	stone	ch	frg																												1	1					
<i>Prunus dulcis</i>	shell	ch	frg			1							4																			5					
<i>Prunus dulcis</i> type	shell	ch	frg									1	1																	1		3					
<i>Pyrus communis</i>	mesocarp	ch	frg																		2											2					
<i>Pyrus/Malus</i>	seed	min	whole								1																					1					
Rosaceae-Pyrus/ Malus/Sorbus type	endo- mesocarp	ch	frg																				1									1					
<i>Vitis vinifera</i>	pip	ch	whole	1		1		1				1																1		1	1	7					
<i>Vitis vinifera</i>	pip	ch	frg	7		3	3	11			1	1	2	4				1			6	2			1	1	2	2	6	2	55						
<i>Vitis vinifera</i>	pip	min	whole/ frg							3	4							1						7			1	2			1	19					
<i>Ziziphus jujuba</i>	stone	ch	frg																						4		3					7					
indeterminata	seed/fruit	ch	frg	12		4	1	7		3	6		11	23				5			10	1	13	1			8	11	2	11	2	132					
OTHER PLANTS																																					
<i>Avena barbata/sterilis</i>	caryopsis	ch	whole									1	1																			2					
cf. <i>Avena</i> sp.	caryopsis	ch	frg																										1			1					
<i>Asperula arvensis</i>	seed	ch	whole										1																			1					
<i>Buglossoides arvensis</i>	seed	min	whole/ frg							2																						2					
cf. <i>Chenopodium</i> sp.	seed	min	whole																				1									1					
<i>Digitaria sanguinalis</i>	caryopsis	unch/ min	frg									1																				1					
cf. <i>Galium</i> sp.	seed	ch	frg																					1								1					
cf. <i>Hippocrepis comosa</i>	seed	ch	whole						1																							1					
<i>Juniperus</i> sp.	needle	unch/ min	frg			1			1	1	5	7			1											7	1					24					
<i>Linum</i> sp.	seed	ch	whole/ frg									2																				3					
<i>Lolium perenne</i>	caryopsis	ch	whole/ frg					1			1													2				1		1		6					
cf. <i>Lotus corniculatus</i>	seed	ch	frg																													2					
<i>Medicago</i> cf. <i>lupulina</i>	seed	ch	whole																		1					1						2					
<i>Medicago</i> cf. <i>minima</i>	seed	ch	whole					1	1														3			1						6					
<i>Ornithopus</i> cf. <i>compressus</i>	pod	ch	frg																							1		1				2					
<i>Ornithopus</i> cf. <i>compressus</i>	pod	unch/ min	frg									1																				1					
cf. <i>Ornithopus</i> <i>compressus</i>	seed	ch	whole/ frg								1	1						1								1						4					
cf. <i>Polygonum</i> sp.	seed	ch	whole																													1					

(continued on next page)

Table 2 (continued)

Taxa	type	ch/ unch/ min	whole/ frg	courtyard	latr1	latr1	latr1	latr1	latr5	latr5	latr5	latr2	latr6	str8	str7	str7	str7	str7	str7	str7	dump	dump	san.	san.	str9	channel	str4	str4	str4	str9	collapse	str4	Total				
					SU	3142	3146	3202	3252	3145	3187	3174	3212	3208	3196	3222	3164	3171	3175	3180	3182	3183	3104	3101	3071	3042	3147	3067	3138	3207	3216	3162	3233	3243			
Rumex acetosa type	seed	ch	whole																														1				
Rumex acetosa type	seed	min	whole							1																							1				
Rumex conglomeratus type	seed	min	whole	1											1																		2				
cr. Rumex sp.	seed	ch	frg																					1									1				
<i>Setaria verticillata/viridis</i>	caryopsis	ch	whole																				2										2				
cf. <i>Trifolium</i> sp.	seed	ch	whole				1																										1				
<i>Veronica hederifolia</i>	seed	ch	frg									1																					1				
<i>Vicia</i> sp.	seed	ch	whole/ frg																			2	1	1				1					5				
cf. <i>Vicia</i> sp.	seed	ch	whole					1			1																						2				
<i>Vicia</i> sp. type	seed	min	whole										1																				1				
Boraginaceae	seed	min	frg						2																								3				
Leguminosae (wild)	seed	ch	frg					1																									2				
cf. Leguminosae	seed	ch	frg				1																										2				
Poaceae	caryopsis	ch	frg																				2										2				
Poaceae	rachis	ch	frg																			1											3				
Polygonacea type	seed	min	whole																														1				
Composita type	seed	ch	int/fr									1																					2				
Indeterminata																																					
indeterminata	shell/stone	ch	frg					1				5	4																				17				
indeterminata	seed/fruit	ch	frg			1	1				1	2	1								9	29	11	31	35	1	4	7	2	1		2	139				
indeterminata	seed/fruit	min	frg	1					1	3	2	4	6											1	1			1	1	1		23					
indeterminata	vegetal remains	ch	whole/ frg	2			1		7	1	1	18	3											1			5	1				40					
indeterminata	sclerotium	ch	whole/ frg																										5	6			11				
Food preparations and charred plant waste																																					
Food preparations		ch	frg	6	7	1	2				6	19	36		3	1						15	2	6	4		1	1	34	30		3	4	181			
Food preparations/ Fruits/Cereals		ch	frg	32	28	6	18	6	32	30		45	219	7	6						9	6	10	112	18	8	2		89	555	323	75	36	15	1687		
Food preparations and charred plant waste		ch	frg	9	10	15	1				26	16	7		1	1	1				16		110	251	5	2	6	67	662	8		16	10	1240			
TOTAL REMAINS (n)				182	117	49	80	15	98	165	432	365	553	112	38	23	6	27	71	57	413	63	471	128	16	58	271	1423	445	161	187	258	6284				

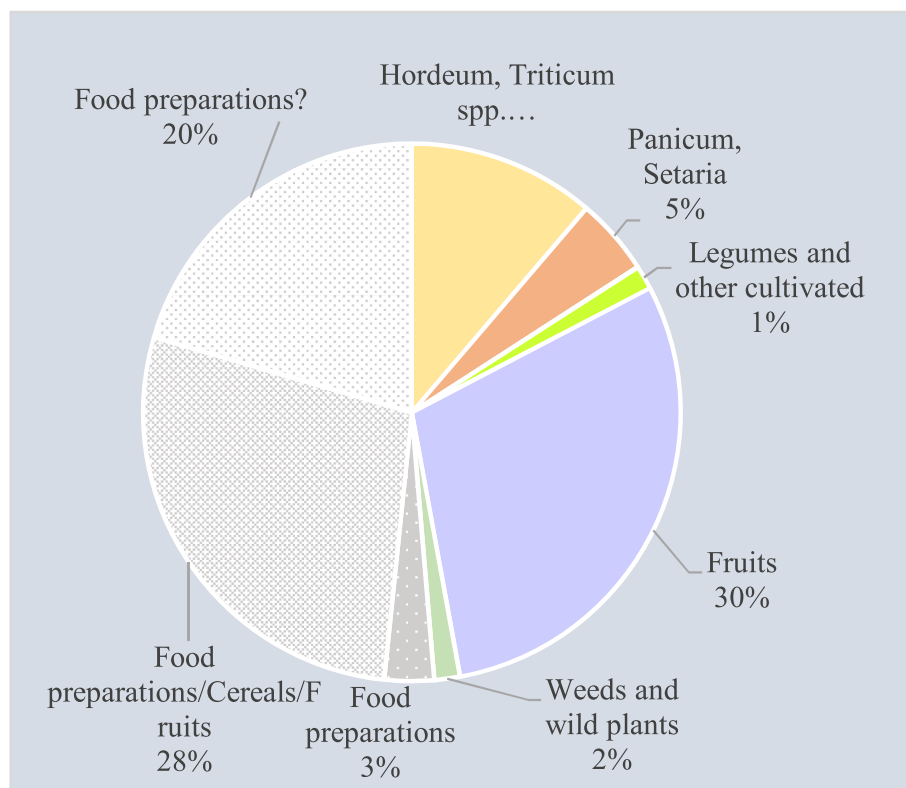


Fig. 2. Pompeii workshop VII 14, 3, carpological remains: percentages of the different systematic/merceological categories.

number and precisely identifiable: rare weeds of cereal fields, such as vetches, hooked or green bristlegrass (*Setaria verticillata/viridis*); more numerous ruderal or vegetable-garden weeds, with oats (*Avena barbata/sterilis*), blue woodruff (*Asperula arvensis*), field gromwell (*Buglossoides arvensis*), cf. *Chenopodium* sp., *Ornithopus* cf. *compressus*, *Rumex conglomeratus*-type and *Veronica hederifolia*. A number of meadow plants are also attested: cf. *Hippocrepis comosa*, *Lolium perenne*, cf. *Lotus corniculatus*, *Medicago* cf. *lupulina*, *Medicago* cf. *minima* and *Rumex acetosa*-type. Other seeds have been determined only at the family level or are plant material that cannot be better framed.

4.6. Food preparations and other plant waste

All the samples, in varying proportions, are characterized by an abundance of small (a few millimetres in length and width) charred remains that are difficult to classify. In some of the fragments, termed "food preparations" (181 fragments), remains of cereal caryopsis epithelia and sometimes fragments of grains agglutinated or immersed in a ground-mass are clearly observed despite their small size; barley and wheats (*Triticum* spp.) seem to have been used mainly for these foods, but the use of millets is not ruled out either. It is not possible to determine with certainty what food these remains came from – that is, whether they are fragments of bread or similar products (Fig. 3f), or remains of grain-based soups or *puls*.

In other cases, the presence of a less compact background mass and the nonexistence of epithelia make it impossible to discriminate between flour-based food preparations and remains of the fleshy parts of fruits. When the fragments are very small and particularly deformed and squashed, one cannot even rule out the possibility that they are still parts of cereal caryopses (in Table 2: food preparation/Cerealia/fruit, 1687 remains).

Other fragments, often tabular, show more or less vitrification: these could also be food preparations, particularly carbonaceous crusts formed at the bottom of containers used for cooking, but since no

morphological elements useful for determination can be observed they are even more uncertain (food preparation/vegetal "slag", 1240 fragments).

The fragments referred to as "medulla" in the table (Table 2) exhibit a very thin epithelium in contact with a more internal vacuolated structure; this could be a tuber or root, perhaps used as food.

5. Discussion and conclusions

Although the contexts analyzed were frequented for about three centuries (late 3rd/early 2nd century BC to AD 79), the composition of the carpological material is basically homogeneous and characterized by a few whole cereal caryopses, a few components of the ears, few legumes, abundant figs and olives, more scarce other fruits, a few weeds and ruderals, and a very large amount of fragmentary cereal and millet caryopses and other charred remains, which can be more or less clearly traced to food preparations.

Since these are sealed contexts that have not undergone remixing, the homogeneity of the composition of the accumulations derived from excrement and meal remains, both in the older and newer latrines and the garbage dump, seems to depend, despite the transformation in use of the area, on a continuity of food choices lasting several centuries.

The carpological remains are not (except to a decidedly limited extent) indicative of natural environments or other types of anthropized contexts: the area occupied by the latrines and the garbage dump was a courtyard that was kept clean; no material other than that mentioned above was thrown into the latrines, and no waste from other activities is documented.

The data indicate that this part of the city was thoroughly urbanized as early as the 2nd century BC, a century earlier than suggested by the study by Murphy et al. (2013) and confirming what was proposed in the work of Ciaraldi and Richardson (2000). Cereal processing, which in earlier times may have also taken place within the settlement, was likely practised outside the town or confined to specific areas (in bakeries or

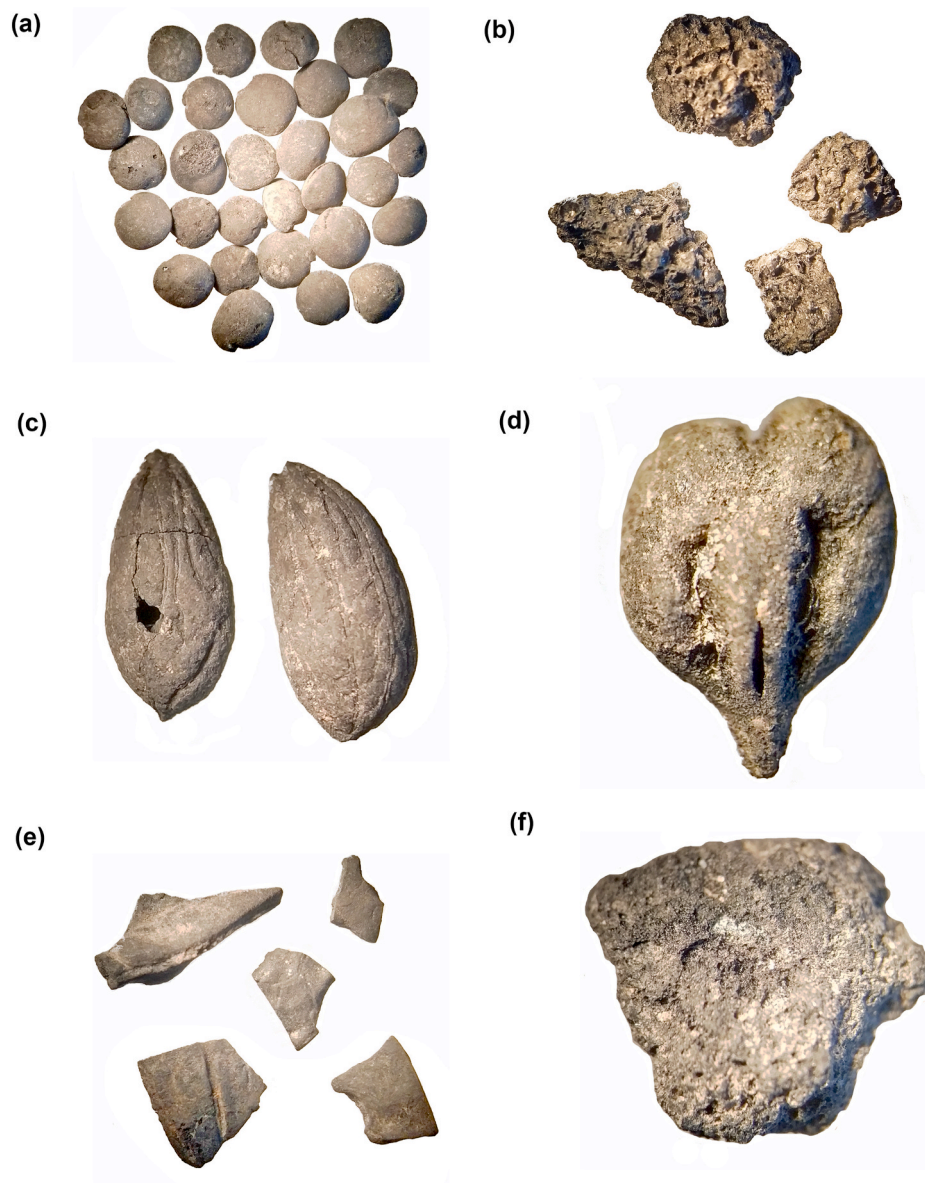


Fig. 3. Fruits, seeds and bread from Pompeii workshop VII 14, 3: a) *Lens culinaris*, seeds; b) *Ficus carica*, syconium; c) *Olea europaea*, stones; d) *Vitis vinifera*, pip; e) *Juglans regia*, shells; f) fragment of bread.

other similar workshops) in the 2nd century BC.

Material discharged from the latrines does not seem particularly abundant given their continuous use; a possible explanation is that they were regularly cleaned and the organic material removed and used as fertilizer in the fields, as has been proposed by previous authors (Hobson, 2009; Jansen, 2000; Jashemski, 2002, 2007; Murphy et al., 2013; Liebeschütz, 2000).

On the basis of the stratigraphic data, the archaeobotanical finds seem to demonstrate the continuity of food choices even after the founding of the Roman colony, providing a picture of fairly varied consumption that included several major cereals (emmer, barley, naked wheat, einkorn, and perhaps spelt) along with millet and foxtail millet, some legumes (lentil, faba beans, bitter vetch, and vetch), other vegetables (beet and coriander), and abundant fruit (figs, olives, grapes, hazelnuts, cornelian cherries, walnuts, pine nuts, plums, almonds, pears, perhaps other Pomoidea, jujubes, hawthorn berries, perhaps strawberries).

Despite the scarce quantities, emmer and foxtail millet seem to have been the most widely used species among the cereals; foxtail millet is

more abundant than millet, in contrast to what Murphy et al. (2013) observed in Regio VI, Insula 1.

On the basis of other Roman-period comparisons, consumption of millets – although these were little appreciated by classical authors, who considered them food for the poor classes (cf. Spurr, 1983, 1986; White, 1995) – seems instead to have occurred consistently even in urban contexts of some affluence, mainly in northern Italy (Bosi et al., 2020). It is possible that in Pompeii millets were consumed by servants and slaves, although the use in the meals of the wealthy of foods deemed suitable for the poor as accompaniments to refined dishes cannot be ruled out. It should be noted that the consumption of C4 plants (i.e. millets and/or sorghum) is increasingly reported by isotopic analyses (De Angelis et al., 2020) although it is not always easy to assess whether this was direct consumption (i.e. of the plants themselves) or indirect, i.e. consumption of meat from animals fed on these plants. Archaeobotanical data seem to indicate that the consumption of millets was indeed lower in central and southern Italy than in the north (see e.g. Bellini et al., 2008; Fundurulic et al., 2022). However, there is no shortage of exceptions. The differences in cereal cultivation between north and centre-south, which seem

evident today, could at least partly diminish as research progresses.

In the contexts analyzed here, modest accumulations of seeds/fruits that could have a different meaning were observed occasionally: a small accumulation of lentils in US 3196 (latrine 6) and one of olives in US 3222, a posthole belonging to structure 8, filled with sediment in later times. The former case might have been due to a trivial accident that occurred during a drying process or during the cooking of a meal; the accumulation of olives, on the other hand, could be related to the craft workshop identified during the excavation, but its function is unclear. Accumulations of olive stones have been repeatedly observed at Pompeii: in [Murphy et al. \(2013\)](#) the different interpretations proposed by [Margaritis and Jones \(2008\)](#); [Robinson \(2002\)](#) are reported to explain their origin, i.e. pressing for oil extraction or the daily consumption of the fruit.

As for the attestation of jujube (*Ziziphus jujuba*), according to Pliny's testimony (N.H. XV, 47) the cultivation of the plant in Italy was initiated by Sextus Papinius in the first half of the first century AD, but this does not exclude the possibility that imported fruits may have come to Pompeii, from Syria or other places in Asia Minor, in earlier times. The species is reported in Pompeii by [Borgogino \(2006\)](#), who cites an oral communication by G. Di Pasquale, but neither the point of discovery nor the chronological attribution are given in the volume. Apart from this single find, the species assemblage corresponds to a typical Mediterranean assemblage that – along with cereals and legumes – includes, in addition to the fig-olive-grape triad, a fair variety of other fruits and (only) beet and coriander. In this regard, it is unclear whether the scarcity of vegetables, spices, and flavourings (species that can be preserved by mineralization), that were certainly in use during the period, is due to the limited consumption of these products or whether it was determined by taphonomic or other phenomena. As previously proposed for Regio VI, Insula I ([Murphy et al., 2013](#)) this assemblage, with few variations, seems to represent a kind of "background noise" corresponding to the most typical diet of the inhabitants of Pompeii in the period under consideration.

CRedit authorship contribution statement

Silvia Pallecchi: Writing – review & editing, Writing – original draft, Supervision, Investigation, Conceptualization. **Elisabetta Castiglioni:** Writing – review & editing, Writing – original draft, Supervision, Formal analysis, Conceptualization. **Mauro Rottoli:** Writing – review & editing, Writing – original draft, Supervision, Formal analysis, Conceptualization.

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Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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