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Destroyed by fire, preserved through time: crops and wood from a Late Bronze Age/Early Iron Age structure at Vila do Touro (Sabugal, Portugal)

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Abstract. Archaeological excavations at Vila do Touro uncovered a Late Bronze Age/Early Iron Age occupation at the top of a prominent hill. It consisted of a structure built with perishable materials, supported by postholes, and a small subcircular storage facility made of stone. Abundant carbonized plant remains were visible throughout the excavation area during the field work suggesting a fire occurred prior to the abandonment of the place, sometime in the 9th century BC.
Archaeobotanical sampling allowed the recovery of abundant wood charcoal as well as charred fruits and seeds. Analyses showed structures were built mostly out of wood from deciduous oak, although pine was also used. Evidence for growth suppression in oak wood suggests direct human management of wood resources, which agrees with other evidences from northern Iberia.
Moreover, the storage facility was used to keep cereals, mostly naked wheat and common millet, but also barley. These were stored fully processed and ready for consumption. Faba beans were also recovered, outside the small storage facility. Results are similar to sites in northeast Portugal and the Central Meseta but contrast with hillforts from Atlantic areas where hulled wheats are staple crops, suggesting a West-East trend also reflected in environmental and cultural features.
Keywords: Proto-history; Beira Interior; storage structure; agriculture

[es] Destruido por el fuego, conservado a lo largo del tiempo: cultivos y madera de una estructura de la Edad del Bronce Final / Primera Edad del Hierro en Vila do Touro (Sabugal, Portugal)

Resumen. Las excavaciones arqueológicas en Vila do Touro detectaron una ocupación del Final de la Edad del Bronce/Primera Edad del Hierro en la destacada cumbre del monte. Se trataba de una estructura construida con materiales perecederos, sostenida por postes, y un pequeño espacio de almacenamiento sub-circular, construido en piedra. Durante el trabajo de campo se observaron abundantes restos de plantas carbonizadas en toda el área de excavación, lo que sugiere un incendio ocurrido antes del abandono del lugar, en algún momento del siglo IX a.C.

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El muestreo arqueobotánico permitió la recuperación de abundante madera carbonizada, así como de frutos y semillas carbonizadas. Los análisis mostraron que las estructuras se construyeron principalmente con madera de *Quercus* de tipo caducifolio, aunque también se usó pino. Evidencias de la supresión del crecimiento en la madera de esos árboles sugieren el manejo humano directo de los recursos de madera, lo que coincide con otras evidencias de la Península Ibérica septentrional.
Además, el espacio de almacenamiento fue utilizado para guardar cereales, principalmente trigo desnudo y mijo común, pero también cebada. Estos fueron almacenados completamente procesados y listos para el consumo. También se recuperaron habas, fuera de la pequeña estructura de almacenamiento. Los resultados son similares a otros sitios del nordeste de Portugal y de la Meseta Central, pero contrastan con los poblados fortificados atlánticos donde el trigo vestido es de cultivo común. Estas diferencias entre los muestreos occidentales y orientales también reflejan las distintas características ambientales y culturales de esas zonas.
Palabras clave: Protohistoria; Beira interior; estructura de almacenamiento; agricultura

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1. Introduction

A great number of archaeobotanical studies have been carried out in Bronze Age and Iron Age contexts from western Iberia in the last decade, incorporating new theoretical and methodological approaches. These have focused mostly on northwest Iberian sites allowing the identification of the main crops consumed and even to address several aspects of agricultural activities in that region (e.g. Teira-Brión 2010, 2019; López-Merino *et al.* 2010; Tereso 2012, 2013; Teira-Brión *et al.* 2016; Tereso *et al.* 2016; Seabra *et al.* 2018; Mora-González *et al.* 2019). The information obtained suggests a well-developed agriculture based on a diverse set of crops, particularly cereals, suitable to a variety of environmental conditions. Although most studies have focused on the Atlantic region, approaches to innermost areas with Mediterranean climate show a two-fold situation: while at Crasto de Palheiros, spelt and millet were the main crops, in the Sabor valley, more to the East, hulled wheats seem to be mostly absent, in contrast to westernmost areas where these were staple crops (Vaz *et al.* 2016, 2017; Tereso *et al.* 2018; Seabra *et al.* 2020; Jesus *et al.* 2020).

Regarding the exploitation of wood resources, there is a long history of charcoal analyses in north-western Iberian Bronze and Iron Age sites, mostly in the Atlantic region (e.g. Figueiral 1990) and to a lesser extent in the Mediterranean areas in Eastern Portugal (Figueiral 2008; Figueiral and Sanches 2013). Efforts in these two regions have been reinforced recently (Tereso 2009; Martín-Seijo 2013; Vaz *et al.* 2016, 2017; Martín-Seijo *et al.* 2017a, 2017b) and the latest studies also include new approaches, by acquiring and interpreting dendrological and taphonomic data (Martín-Seijo *et al.* 2020). Together with a large array of palynological studies (e.g. Muñoz Sobrino *et al.* 1997; Ramil-Rego *et al.* 1998; Gómez-Orellana *et al.* 2010; López-Merino *et al.* 2012) this broad set of paleoecological information attest to a deforestation trend in the Iron Age that, in some areas, had already started in the Middle-Late Bronze Age. The use of wood as a construction material (Figueiral 1995a) or for producing objects (Martín-Seijo and Carrión 2012; Martín-Seijo *et al.* 2015) has also been documented.

However, the abovementioned studies have focused almost exclusively on areas north of the Douro river, in today's Northern Portugal and Northwest Spain (Galicia). Very few archaeobotanical investigations regarding proto-historic agriculture and wood exploitation have been carried out out in Central Portugal. In fact, although relevant paleoecological information, namely from palynological analysis is available (van der Knaap and van Leeuwen 1995; López-Sáez *et al.* 2017), studies addressing plant macrorremains from archaeological sites are rare and focus on very small plant assemblages (Figueiral 1995b, 1995c, 2001). Additionally, impressions of grains from domestic cereals (wheat and barley), seeds of possible domestic pulses and seeds and leaves of several wild species have also been found in ceramics from several sites from the Late Bronze Age and Early Iron Age in the region (Vilaça *et al.* 2004).

The scarcity of archaeobotanical data is particularly relevant considering that inner Central Portugal is a transitional area between the Atlantic and Mediterranean bioclimatic regions and, in the Late Bronze Age and throughout the Iron Age, a region where different cultures came into contact (Vilaça 2005, Osório 2009).

As such, the discovery of a wide assemblage of plant remains at Vila do Touro (Sabugal, Guarda) dating to the 9th century cal BC assumes particular relevance at a regional context and beyond. This paper deals with an apparent domestic context where evidences of crop storage and of wood used to build the structure were found. These will be characterized in detail and simultaneously integrated and contrasted with the archaeobotanical record of western Iberia with a particular emphasis in the Northwest where a wider data-set is available.

2. Vila do Touro

The village of Vila do Touro (municipality of Sabugal, district of Guarda, Portugal) is located in a pass between two high hills in a landscape marked by abundant granitic outcrops and batholiths. In one of these two hills locally known as Alto da Pena we find the remnants of a medieval fortification, clearly visible from a distance, particularly from the north. It is 831 m a.s.l. and rises 70 m to 90 m above the surrounding terrain, providing visual control over a vast region, which is a part of the wide plateau of the Iberian Central Meseta and comprises the Côa valley and the valley of the Ribeira do Boi. Despite its height, it benefits from the presence of two left-margin tributaries of the Côa river (Figure 1).

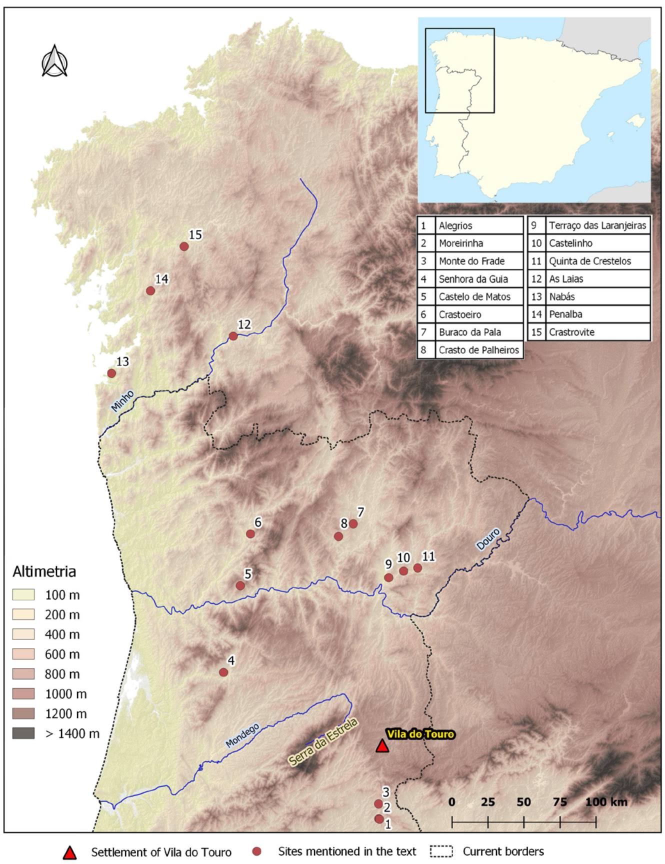

Figure 1. Location of Vila do Touro and other sites mentioned in the text.

The top of the elevation is a crest with a NW-SE orientation but throughout the slopes and even near the top there are several habitable platforms as a result of some topographic heterogeneity. The hill is archaeologically known as Vila do Touro and can be found at the following coordinates: 40º25'04.81'' North, 7º06'24.01'' West (Portuguese military chart 216, 1: 25 000).

From 2014 to 2018, archaeological campaigns were held at Alto da Pena in the scope of the project "Vila do Touro (Sabugal): o sítio, da Proto-história aos tempos medievais", coordinated by two of the authors (MO and RV). The interventions consisted of test pits in areas anticipated to be affected by the implementation of an illumination system planned as part of a rehabilitation and valorisation project of the medieval castle, promoted by the municipality. The identification of proto-historic levels was far from a surprise, since their existence had been suggested by previous surface finds, including a bronze axe (Correia 1946: 284). However, their characterization was only possible through excavations that started in 2014. These revealed occupations dating to the transition from the 2nd to the 1st millennium BC, whose evidences are found in small discontinuous patches, bounded by the site's topography. As such, 12 test pits were excavated in eight sectors throughout the hill, providing diverse sets of information. Up to now, some data regarding ceramics (Vilaça *et al.* 2018) and metals (Ponte *et al.* 2017) has been published, but although results from the first campaign have already been presented in a conference (Tereso *et al.* 2015), information regarding the plant macrofossils remains unpublished.

Figure 2. Vila do Touro: top of the crest, indicating the location of sector II.

2.1. Sector II: structures, stratigraphy and chronology

Sector II is located in a very restricted area at the crest's top, with ample visibility in all directions (Figure 2). Here, structures and artefacts – ceramics, lithics, metals – dating to the Late Bronze Age/Early Iron Age transition were found, together with abundant archaeobotanical remains. Being at a higher elevation than the medieval wall and houses, it was not significantly affected by their construction. Still, few cuts in the granite outcrops of the area document the extraction of stone to be used in medieval structures. Landslides are also attested by refitting of ceramics of sector II with sherds from sector IV, located downwards to the north.

Figure 3. General perspective of Sector II showing the cut in the bedrock, postholes and the subcircular structure.

Considering the stony aspect of the area, a 2 m x 4 m test pit (squares D4 and D5) was initially opened in an area with higher stratigraphic potential, namely an accumulation of sediment in a concavity between batholiths. Proto-historic ceramics were visible at the surface and archaeobotanical remains were discernible already during the first cleaning of the area. Later on, the excavated area was extended, reaching 28 m^2 and allowing the characterization of what seems to be a natural concavity partially shaped by humans. Very large and irregular juxtaposed granite stones bordered the concave area to the north and west, while the bedrock and a granite slab delimited it in the east and south. Overall, an occupation area of 10 m^2 was defined (Figures 3, 4 and 5).

In the central area of Sector II, where the concavity was deeper, an 80 cm x 50 cm subcircular stone structure was found, being interpreted as a storage facility. It was a dry-stone structure built with large, irregular juxtaposed elements laid directly on the bedrock. It was associated with three postholes. The westernmost posthole – b1 – was oval in plan, with an inverted truncated cone shape and was not associated with any stony post-pad, being identified by its dark fill. Postholes b2 and b3 were associated with small stones used as post-pads. The easternmost – b2 – was delimited by three stones and the granite outcrop, taking advantage of a natural cut, while b3, to the south, was delimited by numerous small stones and was alongside the subcircular stone structure, as if it was part of the structure itself. The three postholes delimited an approximately triangular area and distanced from each other c. 1 m (Figures 3, 4 and 5). Unfortunately, postholes did not provide any charcoal.

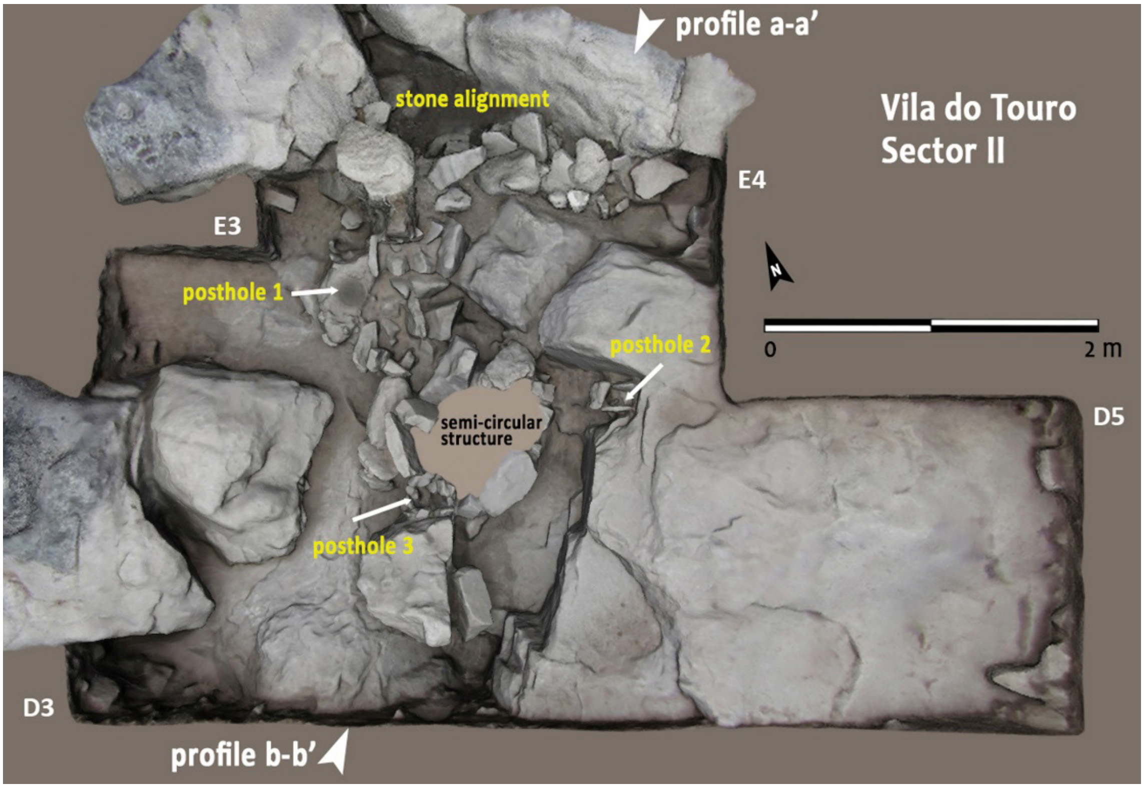

Figure 4. Plan view of Sector II, showing structures mentioned in the text.

It is unclear whether the postholes and the subcircular stone structure were part of a single wooden structure or if these were unrelated, each one integrating a different structure built in distinct moments. Considering the arrangement of the different elements, it is likely that postholes b2 and b3 were directly associated with the small subcircular stone structure while b1 was an independent central posthole supporting the covering of the whole area, eventually in articulation with other support points in the surrounding outcrops.

A simple stratigraphic sequence was recorded. Only nine stratigraphic units (S.U.) were identified, including the superficial layer (S.U. 1). Four S.U. were associated with the subcircular structure:

- S.U. 2 – deposit found around and inside the stone structure, likely connected with its abandonment, resulting from a fire. It is, among the studied deposits, the one with the largest volume and spread through a wider area. It was also the deposit which seemed to have the greatest amount of visible archaeobotanical remains, mostly concentrated inside the structure.
- S.U. 3 – deposit that included the remnants of an occupation level on top of the bedrock, in the south/southwest periphery of the subcircular structure and postholes.
- S.U. 4, 5, 6 and 7 – covered by S.U. 2, these deposits correspond to small patches of dark and less compact sediment, spatially very constrained, north (S.U. 4, 6, and 7) and northwest (S.U. 5) from the structure, covering the bedrock and interpreted as part of the occupation level. Plant macroremains were visible during the excavation of these deposits.
- S.U. 8 and 9 – deposits articulated with another structure, an alignment of stones with a northwest-southeast orientation, delimiting the northern part of the the area by taking advantage of a natural concavity (Figure 3). S.U. 8 corresponds to the sediment between the stones of the structure while S.U. 9 is the deposit where the stone alignment was settled. Considering their location in the edge of the excavated area, these contexts are difficult to interpret but their synchronicity with the storage facility is assumed.

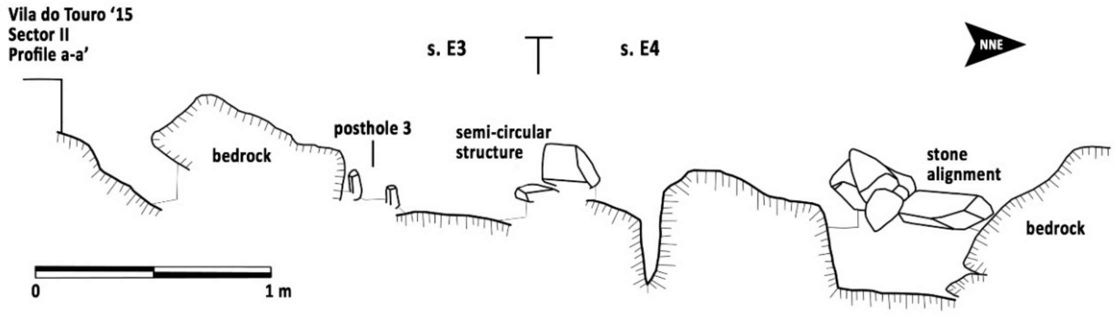

Figure 5. Sector II: profile with structures mentioned in the text (for location of the profile in the excavated area see Figure 4).

A diverse but not very abundant set of archaeological materials, was associated with this structure and with the plant remains recovered, namely ceramics, lithics and metals. The latter included a belt buckle, possibly of tartessic type, two fragments of rods and one chisel (Bottaini *et al.* 2016). Among the ceramics we stress the presence of *a peine* decoration from Cogotas II tradition, typical of the Central Meseta, and Carambolo type ceramics (Vilaça *et al.* 2018). Both the artefacts and the radiocarbon dates (Table 1) point to a chronology in the transition from the 9th to the 8th century BC (Vilaça *et al.* 2018).

Table 1. Radiocarbon dates obtained at Vila do Touro. Calibration: Oxcal 4.4 software, IntCal 20 calibration curve (Reimer *et al.* 2020).

Context	Material	Lab. Reference	14C age (yr B.P.)	Calibrated age BC (2 σ)
S.U. 4, square E4	Wood charcoal (Quercus sp. deciduous)	Sac-3033	2710±35 BP	920-806
S.U. 2, square E4	Grains of Triticum aestivum/durum	Sac-3034	2680±45 BP	919-790

3. Materials and Methods

During two field campaigns, in the years 2014 and 2015, 68 sediment samples and 25 assemblages of handpicked plant remains were recovered in almost all stratigraphic units associated with the small subcircular stone structure as previously described (Table 2).

Sediment samples were processed through hand flotation using meshes of 2 mm in the first campaign and 0,5 mm in the second. While usually only wood charcoal fragments above 2 mm are analysed, the use of 2 mm meshes may compromise the recovery of small plant remains. This methodological issue will be taken into consideration in the interpretation of the results. The original volume (in litres) of the samples collected in the field was not recorded but the collection of sediment privileged contexts where plant remains were more visible during the field work.

The light fractions were sorted using a stereomicroscope and the carpological remains identified with the help of reference collections of the University of Porto Herbarium (PO) and CIBIO, as well as through comparison with morphological atlases and other specialized bibliography (e.g. Beijerinck 1976, Hillman *et al.* 1996, Buxó 1997, Jacomet 2006, Nesbitt 2006).

Light fractions with abundant fruits and seeds were subsampled using a riffle box and results presented are extrapolations that take into consideration the percentage of light fractions studied (Table 3) and correspond to potential quantities. As an example, in sample 74, a subsample of 10,78 g out of the 43,07 g of light fraction available was sorted. In this subsample, 120 grains of barley have been counted but, considering 25,03% of the sample was sorted, it is estimated that the whole sample (including the unsorted portion) includes 479 grains. Extrapolation was done only when a minimum of 10 units was detected in the subsample. No extrapolation was done over fragments. Decision for dividing samples and regarding the percentage to be sorted was done on a sample by sample basis, depending on the volume and apparent richness in carpological remains. Subsamples vary between 6% and 66% of the original weight of the light fractions, but most vary between c. 10% and c. 51%. The higher percentage corresponds to a sample from S.U. 2Base because it was the only sample from this deposit that was subsampled. The lowest percentages (below 10%) are from larger samples.

Table 2. List of samples and contexts sampled, discriminating the type of recovery (flotation or handpicking).

S.U.	Square	Campaign	Floated	Handpicked
2	D3	2014	2	1
	D3/4		4	
	D4	2015	3	
	E3			1
	E3/4	2014	7	2
	E4	2014	2	2
		2015	2	
2 Base	D3/4	2014	7	2
	E3	2015	1	
	E4	2014		2
	-		1	
3	D/E3	2014	2	2
	E3/4		2	
	E4	2015	1	1
		2014		1
4	D3/4	2014	7	
	E3		1	
		2015		1
	E3/4	2014	1	1
	E4			4
	F3/4	2015	1	
	-	2014	2	
5	D3/4	2014	3	
	E3		3	
	E3/4		2	1
8	E4	2015	10	2
9			4	2

Wood charcoal fragments larger than 2 mm were hand-sectioned in order to obtain the three diagnostic sections. These were observed under a reflected light microscope. Identification was aided by wood anatomy atlases (*e.g.* Schweingruber 1990; Vernet *et al.* 2001).

Several dendrological characteristics and anatomical alterations were also recorded for each charcoal fragment, namely:

– tree-ring curvature (strong, moderate, weak or indeterminate – following the procedure proposed by Marguerie and Hunot 2007), related to the calibre of wood, provides information regarding the minimum size of the wood piece that was burned;
– vitrified tissue, whose presence in carbonized wood has been associated with several factors (e.g. burning of green wood and low-oxygen combustion) although the factors behind this alteration are yet to be truly understood (MacParland *et al.* 2010);
– radial cracks, an alteration resulting from the combustion process, which is associated with the burning of green wood (Carrión 2007; Théry-Parisot and Henry 2012);
– the presence of biological degradation agents (*e.g.* xylophages and fungi) which provides information about the preservation state of fuelwood prior to the carbonization (Marguerie and

Hunot 2007; Moskal-del Hoyo *et al.* 2010);

- reaction wood, an anatomical modification that can be caused by mechanical stress; common in branches but also in stems when in steep terrains (Schweingruber 2007).

The size of charcoal fragments was also recorded using four size classes: 1 (up to 5 mm), 2 (6 mm to 10 mm), 3 (11 mm to 20 mm) and 4 (21 mm to 50 mm). However, size classification was not recorded in the earliest phases of lab work so data available is restricted to 48% of the assemblage.

Table 3. Data regarding the subsampling.

Inventory	S.U.	Original weight (g)	Sorted - weight (g)
70	2	21,9	5,41
71	2	32,7	3,86
72	2	18,53	3,43
73	2 Base	20,94	13,82
74	8	43,07	10,78
75	8	40,37	5
77	8	61,75	4,44
78	8	33,57	4,75
79	9	45,83	3,19
81	8	50,61	3,23
82	9	19,86	11,97
83	8	7,02	3,41
84	8	46,17	6,38
85	8	58,79	6,43
86	2	22,06	11,36
87	8	51,06	3,18
88	9	31,38	3,24
89	8	16,9	3,88

4. Results

Plant remains found above the occupation floor – S.U. 3, 4 and 5 – are clearly connected with deposit [2] that covered the area, apparently with the remnants of a fire. On the other hand, remains found in S.U. 8 and 9 in association with the small wall are likely from the same phase as the rest and their position within the stones of this structure may be the result of disturbances. As such, these will be interpreted together, although issues that are particular to each S.U. will be highlighted when considered relevant. Data presented in all tables discriminate the different S.U.

4.1. Carpology

There is a great predominance of *Panicum miliaceum* (common millet) grains (Figure 6, Tables 4 and 5), followed by grains of *Triticum aestivum/durum* (naked wheat) and *Hordeum vulgare* (hulled barley). *Vicia faba* (faba bean) is much less frequent. All other macroremains are very rare and include *Pisum sativum* (peas), grains of *Avena* sp. (wild or cultivated oat) and few remains of wild plants such as Poaceae (*Festuca* type), *Raphanus raphanistrum*, *Rumex acetosella*, *Rumex acetosa* and unknown Fabaceae. A single pip of *Vitis vinifera* has also been recovered. It has a rather roundish shape but whether this is from a wild or domestic grape is impossible to determine based on a single seed.

The recovery method used in the first campaign is conditioning this perspective to an extent which is difficult to assess. In the 2014 samples that were processed with a 2 mm mesh, naked wheat grains are clearly more frequent than millet, which is unsurprising since millet grains are usually smaller than 2 mm. Although biometric analyses were not carried out, most *Panicum miliaceum* caryopses from the first campaign are quite big, on the upper limit of the species grain-size variation (according to Jacomet 2006, around 2,2 mm), justifying its recovery with such large meshes. In S.U. sampled in 2015, processed with 0,5 mm meshes, millet grains are predominant, even in those S.U. that had already been sampled in the previous campaign. As such, the 2015 samples (Table 4) likely represent more accurately the proportions between taxa in the studied contexts.

Table 4. Fruits and seeds: results from the 2015 campaign.

	S.U.	**2**		**2 Base**	**3**	**4**	**8**	**9**	
Crops	**Square**	D - 4	E - 4	E - 3	E - 4	F 3/4	E - 4	E - 4	**Sum**
Hordeum vulgare subsp. *vulgare*	Grain	16	179	47	1	9	3373	889	4514
	Grain (frag.)	11	105	29	4	3	452	136	740
H. vulgare cf. var. *nudum*	Grain			1				1	2
Panicum miliaceum	Grain	5937	6175	1482	9	4	58964	16476	89047
	Grain (frag.)	300		347	1		1064	618	2330
Panicoideae	Grain	8		4			177	24	213
	Grain (frag.)	637		87			578	201	1503
	Scutellum	42		1			2	4	49
Triticum aestivum/durum	Grain	1175		430	209	60	6259	1143	9276
	Grain (frag.)	1088		391	151	17	4168	813	6628
Triticum sp.	Glume base						1		1
Triticeae	Grain	109	6	24	1		180	12	332
	Grain (frag.)	1029	318	974	24	11	3005	978	6339
	Scutellum						1	1	2
Vicia faba	Seed		3		1	1	69	6	80
	Seed (frag.)		13		4		228	13	258
	Sum - crops (units)	7245	6363	1988	221	74	69022	18551	103464
Wild									
Avena sp.	Grain						1		1
Fabaceae	Seed						4	1	5
Fabaceae	Seed (frag.)			1			62	4	67
Festuca/Lolium	Grain						1		1
Raphanus raphanistrum	Siliqua (frag.)				1				1
Rumex acetosa	Achene	1		1					2
Rumex acetosella	Achene			1				2	3
Rumex sp.	Achene	1		1			1	1	4
Vitis sp.	Seed						1		1
Undetermined					1				1
Undetermined	(frag.)	506	984	145	6		1482	441	3564

Some S.U. were mainly, or even exclusively, excavated in the first campaign and their samples were nearly all processed with larger meshes preventing the proper characterization of the carpological content. Still, when we compare different deposits summing the 2014 and 2015 results (see Tables 4 and 5), *Panicum miliaceum* only fails to predominate in S.U. 3 and 4 where *Triticum aestivum/durum* is the main crop. But most samples from these contexts were recovered in the first campaign and processed with large meshes.

Table 5. Fruits and seeds: results from the 2014 campaign. Fl. – floated with 2 mm mesh; Ha. – handpicked.

	S.U.	2							2 Base			3			4				5			
	Square	D3		D3/4	E3/4		E4		D3/4		E4		E3/4	E4	D3/4	E3/4	E4		D3/4	E3	E3/4	
Crops	**Recovery**	Fl.	Ha.	Fl.	Fl.	Ha.	Fl.	Ha.	Fl.	Ha.	Ha.	Fl.	Fl.	Ha.	Fl.	Fl.	Ha.	Fl.	Fl.	Ha.	Fl.	
Hordeum vulgare subsp. *vulgare*	Grain	46	4	48	39	1	144		22			11	182		33	4		6	6		7	553
	Grain (frag.)	9		6	13		12		14			6	21		3	1		3	1		2	91
Panicum miliaceum	Grain			36	27	1	17		16				16		14	64	1	4	5	1	39	241
	Grain (frag.)																		1			1
Panicoideae	Grain (frag.)			1					3						2		1					7
Triticum aestivum/durum	Grain	63	6	396	758	28	455		390			99	219		186	116	1	139	50		54	2960
	Grain (frag.)	3		45	78	5	48		55			12	18		28	25		16	14		11	358
	Grain (long. frag.)	2		20	51	2	18		39			14	8		15	7		6			2	184
Triticum sp.	Grain								2					1				5				8
	Grain (frag.)										1				1							2
Triticeae	Grain				2				1									2				5
	Grain (frag.)	6		101	125	7	25		119			5	20	2	39	45		76	6	1	72	649
Pisum sativum	Seed						1		1													2
Vicia faba	Seed	4	4				20	1					1									30
	Seed (frag.)	1					9							2		1						13
	Seed - Cotyledon	2		1			13															16
	Sum - crops (units)	113	14	480	826	30	637	1	432	0	0	110	418	1	233	184	2	156	61	1	100	3799
Wild																						
Fabaceae	Seed (frag.)								1				1						2			4
Poaceae	Grain						1															1
	Grain (frag.)																	1				1
Undetermined	Seed/fruit						1													1		2
Undetermined	Seed/fruit (frag.)			9	1		5		39	1			7	2	2			7	5	58	1	137

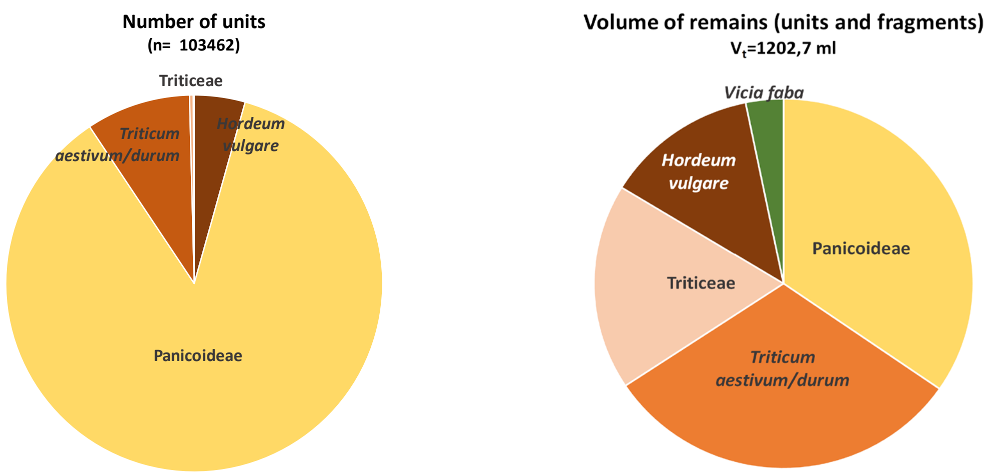

Figure 6. Fruits and seeds: proportion of crops in samples of the 2015 campaign (all S.U.). Panicoideae includes *Panicum miliaceum* and grains identified at the tribe level.

Taking into consideration differences in size between millet and wheat/barley grains, the huge discrepancies in amount of grains must not be overestimated and the volumes of each taxon should be compared (Figure 6). Still, considering the abovementioned methodological issues of the first campaign, only the volume of plant remains recovered through flotation in the 2015 campaign will be compared. In these samples, grains of Panicoideae (including grains of *Panicum miliaceum* and those identified at tribe level) comprise c. 86% of the number of grains/seeds of crops but only c. 33% of the volume; grains of *Triticum aestivum/durum* comprise only c. 9% of all units but 31% of the crop´s volume; grains of *Hordeum vulgare* represent c. 4% of grains/seeds of crops and 13% of the volume. Overall, volume of wheat, barley and Triticeae, the latter likely comprising mostly wheat and barley, surpasses those of millets (Figure 6).

Seeds of *Vicia faba* are not very abundant but were found in all S.U. It is most abundant in S.U. 8 and, independently of the S.U., almost all seeds (242 out of 251) were recovered in square E4, outside the subcircular structure. They may have been separated from the rest of the crops by some perishable structural element or container now impossible to detect.

4.2. Wood charcoal

Charcoal analysis revealed 19 taxa and anatomical types (Table 6). Given the different taxonomical detail – including identifications at species, genus, family and class levels – these correspond to a minimum number of 11 species. Tree taxa are far more abundant than shrubby species but diversity is similar in both groups.

There is a great predominance of *Quercus* spp. in the majority of the S.U. (67,7% of the whole assemblage) (Figure 7). *Quercus* sp. deciduous (= *Quercus* subg. *Quercus*) clearly dominates (53,7%), followed by fragments too small to understand whether they belong to evergreen or deciduous trees (*Quercus* sp. – 13,7%). Clear *Quercus* sp. evergreen fragments are very rare (0,32%). *Pinus pinaster* (10,5%) is much less frequent than *Quercus* spp. but it was recovered in all S.U., the same as *Cistus* sp. (5%) (Table 6). All other taxa are rare – less than 20 fragments and below 1%.

Table 6. Charcoal analysis: results from the two campaigns.

S.U.	**[2]**						**[2] - Base**			**[3]**				**[4]**					**[5]**				**[8]**	**[9]**	**Total**
Grid square	D3	D3/D4	D4	E3	E3/E4	E4	D3/D4	E3	E4/E2	D3/D4	D3/E3	E3/E4	E4	D3/D4	E3	E3/E4	E4	n/a	D3/D4	E-3	E3/E4	E4	E4	E4	
Arbutus unedo						1																			**1**
Cistus sp.	2	4	12		7	13	11	4			1		12	8		1		10	2	4		2	6	26	**125**
Erica australis /arborea			1				1											2							**4**
Erica scoparia /umbellata					2																				**2**
Erica sp.			1			1		1					1										1		**5**
Fabaceae		1	2			1	1						2			1		2					1	5	**16**
Fraxinus sp.			2		1		3						1					2				1		4	**14**
Juniperus sp.											1		1												**2**
Pinus pinaster	1	17	18		4	18	52			1	10	6	18	18			12	12	39	8	2	5	8	15	**263**
Pinus pinea /pinaster		1			1		2				3					1	2				3				**13**
Pinus sp.			2			1		2			1		3										1	4	**14**
Quercus sp. - deciduous	2	36	52	46	42	47	44	65	49		5	138	120	110	108	31	126	15	19	5		4	20	259	**1343**
Quercus suber					1		1									2									**4**
Quercus sp. - evergreen						2		1																1	**4**
Quercus sp.		8	36	13	14	31	30	24	1		2	25	24	23	7	9	25	16	9	2		4	19	22	**344**
Quercus/Castanea			2			1							2										2	2	**8**
Dicotyledon		42	25	1	21	23	37	3			4	13	23	24		3	1	18	29	6		4	19	31	**327**
Monocotyledon			1																						**1**
Indeterminate			3									2		2								1	1	2	**11**
Total	**5**	**109**	**157**	**60**	**93**	**139**	**182**	**100**	**50**	**1**	**27**	**184**	**207**	**185**	**115**	**48**	**166**	**77**	**98**	**25**	**5**	**21**	**78**	**371**	**2503**

There is no marked difference between the distinct S.U. and squares. Only in the deposits and squares with few charcoal fragments do we do not find a clear predominance of oak charcoal. S.U. 5 is the only deposit where *Pinus pinaster* predominates (Figure 7) but it is also one of the deposits that provided less charcoals. Most charcoal pieces of pine come from squares D3/D4 and E4 and S.U. 5 and 2Base where they show a particular incidence of vitrification (reaching c. 25% of the fragments). Fabaceae and *Fraxinus* sp. charcoal are rare but are only absent from a single S.U. Other taxa are found throughout the site with no discernible pattern related to either the S.U. or to spatial location. Deposit [2] (including [2] and [2base]) shows the highest diversity of taxa but is also the one from which the most charcoal was studied and covered a larger area than any other deposit.

Most charcoal fragments were small, i.e. up to 5 mm, and almost all that were larger belonged to *Quercus* sp. deciduous. This is the only taxon in which most classified fragments were actually larger than 5 mm. Pieces above 10 mm were recovered in four deposits but are restricted to two squares (E3 and E4) and are almost all (177 out of 181) *Quercus* sp. deciduous.

13,3% of the charcoal was vitrified to some extent. There is a particular incidence in fragments identified as Dicotyledon (58,72%) with the vitrification being one of the causes for the diagnosis at the class level. In *Quercus* sp. deciduous only 4% of the fragments show vitrification although values can reach 16% in some

S.U./squares. In *Pinus pinaster* values are 9,5% overall. Percentages of vitrification can be slightly higher in other taxa but the small number of fragments makes this less relevant.

As for radial cracks, these have been recorded in few charcoal fragments (3,4% of the assemblage), with *Quercus* sp. deciduous presenting the highest number: 26 fragments (1,9% of all deciduous oak fragments). Reaction wood is even rarer and restricted to gymnosperms. It was recorded in 15 fragments of *Pinus pinaster* (5,7% of this taxon). The presence of xylophages' galleries is very rare.

On the other hand, valuable information was derived from tree rings. Curvature was discernible in 42,5% of the fragments and only values from *Quercus* sp. deciduous, *Quercus* sp. and *Pinus pinaster* were relevant due to their higher number of fragments. Deciduous oak fragments with discernible ring curvature (690 out of 1343) showed mostly weak curvatures (56%) and strong curvatures were found in 16,2% (the remaining were moderate). No relevant pattern was detected among S.U. and within the excavation grid. As for fragments identified as *Quercus* sp., 129 out of 344 were classified and 77,5% had weak curvatures. All fragments of *Pinus pinaster* in which ring curvature was recorded (79 out of 184) showed weak curvature.

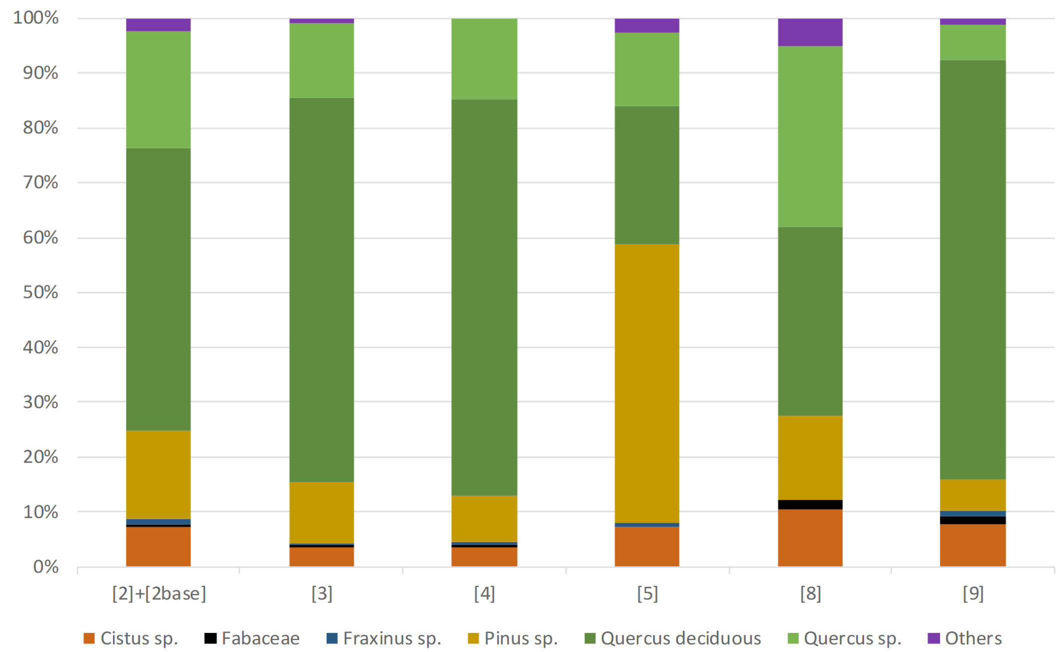

Figure 7. Charcoal analysis: relative frequency. "Others" include all taxa with less than 10 fragments in all samples combined. Pine charcoals have been summed and presented at the genus level, but are likely all from *Pinus pinaster*. For this analysis, data from S.U. 2 and 2 Base have been merged. Full data in Table 6.

Finally, growth suppression was detected in 103 fragments of charcoal, all from *Quercus* sp. deciduous, comprising 7,7% of all fragments from this taxon. In some fragments, more than one sequence of 2 to 14 narrow rings separated by 1 to 7 long rings was found. Growth suppression is characterized by a reduction in ring width, usually in a succession of several tree-rings, which can be due to natural and anthropogenic factors, such as pruning, lack of light due to shading and defoliation caused by human or natural agents. At Vila do Touro, it was identified differentially throughout the grid and the stratigraphy, with a particular incidence in some deposits and areas (Table 7). In S.U. 4 it was recorded in 26 fragments (22,6% of all Fagaceae) from square E3 and in 23 (15,2% of all Fagaceae) from E4. In E-3 there is a great predominance of weak and moderate curvature in the fragments with growth suppression. In S.U. 9, square E4, it was recorded in 22 fragments of *Quercus* sp. deciduous (7,7% of all Fagaceae), showing a great predominance of strong and moderate curvatures. Considering the limited extension of S.U. 4 and 9, it is tempting to suggest these fragments come from just two pieces of wood – one in each deposit and square – that were split after the fire. Although it does not necessarily exclude this possibility, one must note that different sequences of narrow and long rings were found in each of the deposits. In other S.U. and squares growth suppression is rare (under 8 fragments from each combination of S.U. and square) and no fragments with this characteristic were recovered in some squares/S.U., namely D3 and D4 (S.U. 2 and 3), E3 and E4 (S.U. 5), and all of S.U. 8.

Table 7. Charcoal analysis: number of fragments of *Quercus* sp. deciduous with evidence of growth suppression.

S.U.	Grid square	Nº of fragments
2	E-3	5
	E-3/E-4	3
2 - Base	D-3/D-4	1
	E-3	4
3	E-3/E-4	2
	E-4	7
4	D-3/D-4	6
	E-3	26
	E-4	23
	n/a	3
5	D-3/D-4	1
9	E-4	22

5. Discussion

5.1. A structure destroyed by fire

A large assemblage of charred plant remains was found in a rather small area on the highest platform in Vila do Touro and its interpretation demands an understanding of how it was formed. Most carbonized plant assemblages are the result of day-to-day activities. This is common for wood charcoal, originated in domestic hearths and ovens and then deposited in waste dumps, eventually reused later and spread throughout the site (Asouti and Austin 2005). But this is also true for fruits and seeds. Carpological assemblages are frequently composed of crops and weeds that are likely leftovers of processing activities that have been reused as fuel, or accidently burned when processing involved fire (Hillman 1981; van der Veen 2007; Fuller *et al.* 2014). However, large assemblages may be the result of unintentional, more catastrophic fires, whether localized and affecting specific structures or affecting wider areas of the settlement (Tereso *et al.* 2013b, Seabra *et al.* 2018, Teira-Brión 2019). Naturally, plant remains originating in these different manners lead to distinct interpretations.

Taking this into consideration, it is necessary to understand how and why plant materials got carbonized at Vila do Touro, becoming inappropriate for consumption and allowing their preservation to this day. Some evidence suggests the context was a structure supported by posts that included a storage facility, both destroyed by fire.

It is unlikely that natural phenomena were responsible for the transportation of plant remains and archaeological artefacts from other areas into this sector, after its abandonment, considering the structure is in the highest point of the hill. On the contrary, some erosion surely occurred as the area is very exposed. Thus, only through human action could the charred plant remains have been transported to the area, if they were not carbonized there. That could have occurred if that place had been used to dispose rubbish, however the presence of a waste dump in the highest area of the settlement is doubtful and the characteristics of the assemblage suggests otherwise.

Carpological remains, particularly cereals, are very abundant and form a coherent assemblage, consistent with storage strategies identified in NW Iberia (see below). In fact, more than 100 000 grains of cereals were found mostly concentrated in a small area and associated with some charcoal and a limited assemblage of archaeological artefacts. Wood charcoal can easily be interpreted as remains of the structure itself and dendrological data point towards that interpretation (see below). Other evidences besides plant remains have been recovered but these are not very abundant and may be related with other usages of the area. Overall, we would expect secondary depositions in a waste disposal area to be more heterogeneous. Some rare exceptions have been registered in nearby regions, namely at the site of Castelinho (Torre de Moncorvo, NE Portugal). Here large concentrations of charred cereal grains have been found in embankments and defensive walls (Seabra *et al.* 2020). These apparently coherent assemblages could have been charred while concentrated elsewhere, for instance in some storage facility, as the result of a destructive event and afterwards used as filling material in such structures. Still, in the case of Vila do Touro, this is unlikely considering the plant assemblage was found in a well delimited area with no clear signs of having been used as a waste disposal area.

Thus, sector I of Vila do Touro must have encompassed a structure built in perishable materials with a small stone structure inside that could have been used to keep cereals for an undetermined time-span. There are no parallels in the region for the use of such kind of structures for storage but considering all evidence, this could have been a regular domestic context with an area to keep food to be consumed in a short time, instead of the large storage facilities found in other sites of NW Iberia.

Considering this interpretation, the charcoal assemblage must include material coming from domestic use of fuel in the area but also wood from the construction itself or from other structural elements, despite no actual evidence of woodworking having been found. There are no traces of wattle and daub, such as baked clay with plant imprints, which would likely be preserved in case of a fire, suggesting such construction techniques may have not been applied in the structure.

According to our results, wood from deciduous oak – *Quercus faginea* and *Quercus pyrenaica* are common in the region – could have been the main construction material, but the truth is that it is not possible to clearly discriminate wood used for construction from that used for other domestic purposes. Likewise, the concentrations of pine charcoal may reflect former construction material. The possibility that wood from these two species was used for construction is reinforced by the fact that ring curvatures are mostly weak, suggesting mature trees. It is not possible to rule out that this predominance results from the fragmentation of a few large pieces after the fire, giving a false idea of abundance. Either way, the possibility of them belonging to some structural element is maintained. Pine wood is suitable for poles due to its capacity to hold tangential weight (Carvalho 1996). Deciduous oak wood has a moderate capacity to hold both tangential and transversal weights (Carvalho 1996) and its use as construction material is well testified in Iron Age sites in Northwest Iberia where it was used for shaping poles and beams (Carrión 2005; Martín Seijo and Carrión 2012). Still, throughout time wood from these taxa have been used for multiple purposes.

Some of the deciduous oak wood recovered shows clear signs of growth suppression (Figure 8), which may be due to human management. Pruning, for instance, may produce sequences of short rings interpolating regular rings, depending on the timing of human actions over the tree. Despite natural agents, such as insects, fungi and several pathogens, being able to lead to growth suppression through defoliation (Schweingruber 2007), it is unlikely that they produce the different patterns identified in the wood charcoal analysed. Moreover, the management of trees to produce pieces of particular sizes and shapes to be used as construction material in Iron Age Northwest Iberia has been proposed by other authors (Carrión 2005; Martín-Seijo and Carrión 2012; Martín-Seijo 2013).

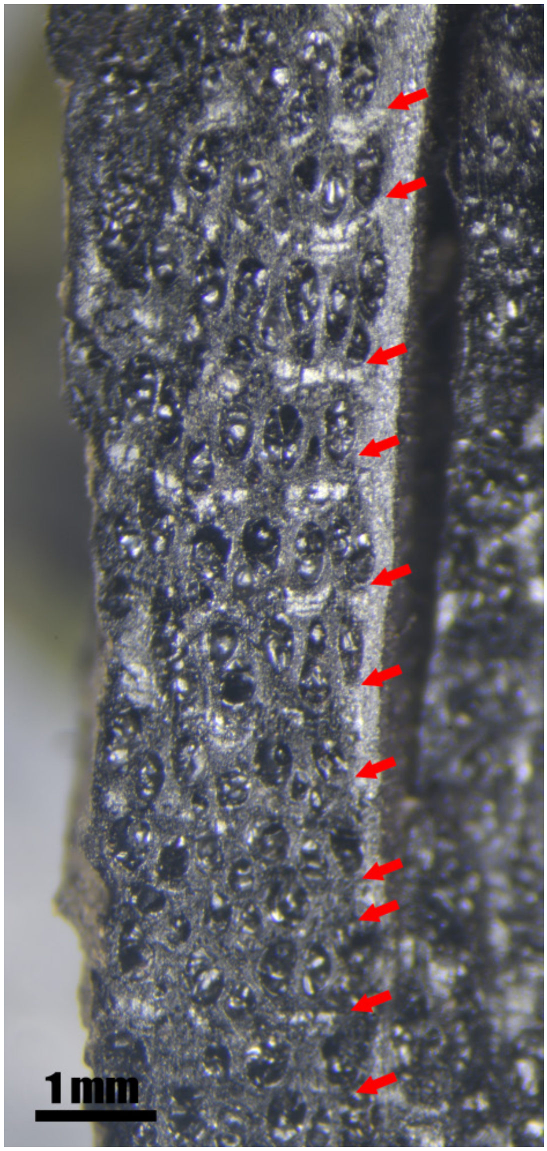

Figure 8. Growth suppression in a *Quercus* deciduous charcoal. Arrows are pointing to the beginning of each ring.

Bearing in mind the palynological data from several sequences in the Serra da Estrela mountain range (van der Knaap and van Leeuwen 1995), the main taxa identified in the wood charcoal spectrum were present in the region and could have been selected with little effort. In what has been called a "semi-deforested cultural landscape", deciduous *Quercus* species would dominate the local forests, while pines would be infrequent (van der Knaap and van Leeuwen 1995). In these sequences, different pine species are not discriminated and the work at Vila do Touro, intrinsically palaeoethnobotanical due to the nature of the contexts that were studied, gives a valuable information for future paleoecological studies. The same taxa, including *Pinus pinaster*, have been found in charcoal analyses from Late Bronze Age sites in the region, such as Monte do Frade, Moreirinha and Alegrios (Figueiral 1995b,1995c).

5.2. Cereals prepared for consumption

It was concluded that sector 1 in Vila do Touro had an area used to keep plant foodstuffs, mostly naked wheat and common millet, but also barley and faba beans. Considering chaff is almost absent, all these were likely fully processed at the time of carbonization.

Little is known about how these grains and pulses were consumed in the Iron Age and we cannot exclude the possibility that grains of different cereals and eventually other fruits and seeds were kept jointly because they were going to be prepared for consumption together in some form. However, evidence from other sites, usually slightly more recent than Vila do Touro, suggest these crops were frequently kept in the same structures, even in facilities likely destined for long-term storage.

Large assemblages of crops are sometimes found in association with storage facilities, probably resulting from fires followed by an abandonment of the structures. In Northwest Iberia such contexts have been recorded in the Middle and Late Iron Age wattle and daub storage structures of As Laias (Ourense, NW Spain – Álvarez González and López González 2000; Tereso *et al.* 2013b) and Castrovite (Pontevedra, NW Spain – Rey Castiñeira *et al.* 2011; Teira Brión 2019), the Late Iron Age/Early Roman stone and wattle and daub structures of Crasto de Palheiros (Murça, NE Portugal – Figueiral *et al.* 2017; Leite *et al.* 2018), the Early Iron Age storage vessels of Penalba (Pontevedra, NW Spain – Aira Rodríguez *et al.* 1990) and, eventually, the Late Iron Age storage pits of Crastoeiro (Mondim de Basto – NE Portugal – Seabra et al, 2018). Hulled wheat predominates in all these sites, with the exception of Castrovite where millets predominate, but hulled wheat is also frequent. At Castelinho (Torre de Moncorvo, NE Portugal, Seabra *et al.* 2020) and Quinta de Crestelos (Mogadouro, NE Portugal – Tereso *et al.* 2018) abundant crops, predominantly naked wheat, have been found in deposits associated with 2^{nd}-1^{st} century BC elevated granaries. Although it is possible that these were not primary contexts, the assemblages that were studied likely result from storage in these facilities (see discussion in the mentioned references).

In all these sites, naked wheat and millet are usually stored fully processed and are frequently found in the same contexts independently of what is the main crop. Evidence suggests they were frequently stored together, despite likely being cultivated separately and showing different characteristics, not only at the level of grain size but also in taste and leavening capacity. Storing a combination of grains of different sizes helps maintain the levels of oxygen low, preventing the dissemination of insects in a long-term storage. This could justify why millets are found stored together with wheat and/or barley in some Iron age sites in Europe (Marinval 1992; Buxó and Piqué 2008; Issenmann *et al.* 2012) as well as in NW Iberia (see references above) and Vila do Touro. If grains were kept for short periods of time in the subcircular structure, it is possible that the mixing of these species documents their combined storage in other areas, before transportation to that particular place.

The finding of faba beans and even fruits together with cereals is also not exclusive to Vila do Touro. Cereals are frequently found stored along other fruits and seeds, usually scarce, that surely were not weeds or by-products of cereal processing, such as acorns, *Rubus* sp., grapes and pulses (faba bean and peas). Whether this reflects accumulation of remains from previous uses of the structures, mixing with material from other origins after the structures' abandonment, or intentional practices is sometimes difficult to assess. Different cereals and other plants could be stored separately in sacs or separated by divisions made with perishable materials. Both would be difficult to detect today. In the case of Vila do Touro, the structure is very small and distinct from storage contexts from the abovementioned sites but the same interpretative possibilities can be posed, still with no evident answer. The differential distribution of faba beans, mentioned before, may be related to some space organization now difficult to characterize, eventually related to perishable materials – wood, basketry or others. However, it is not possible to confirm this hypothesis. Some kind of organic container may have been used to keep millets at an Iron Age hut in Nabás (Martín-Seijo *et al.* 2020) but evidence from Vila do Touro is far from clear.

5.3. Stored crops from Vila do Touro in a regional context

Crops identified at Vila do Touro have been frequently found in other archaeological sites from the 1st millennium BC in NW Iberia, dating both to the Bronze Age (Silva 1976, 1988; Tereso *et al.* 2016; Jesus *et al.* 2020) and the Iron Age (Teira-Brión 2010; Tereso 2012; Tereso *et al.* 2013b; Teira-Brión *et al.* 2016; Figueiral *et al.* 2017; González Alvárez *et al.* 2018; Seabra *et al.* 2018; Leite *et al.* 2018; Ramil-Rego *et al.* 2018; Teira-Brión 2019). Common millet was a relevant spring crop at least since the Late Bronze Age and kept its relevance throughout the Iron Age and the Roman period (Silva 1976; Tereso 2012; Tereso *et al.* 2013a; Tereso *et al.* 2013b; Tereso 2013; Moreno-Larrazabal *et al.* 2015; Figueiral *et al.* 2017; Leite *et al.* 2018; Teira Brión 2019). It is common in contexts from the Atlantic (westernmost areas) and Mediterranean (Northeast Portugal) bioclimatic areas. The same is true for free-threshing wheat, barley and faba bean, which are commonly found throughout the whole region. The latter is the only pulse frequently found. Peas are rare and the site where they are the most common is Senhora da Guia (S. Pedro do Sul, Portugal), south from the Douro river (Silva 1976).

Figure 9. Examples of fruits and seeds: 1) *Vicia faba*; 2) *Avena* sp.; 3) *Hordeum vulgare*; 4) *Triticum aestivum/durum* 5) *Panicum miliaceum*; 6) *Rumex acetosa*. Scales: 1 mm.

Oat was likely introduced in northwest Iberia in the Iron Age (Tereso 2012; Tereso *et al.* 2013b), but this chronology is difficult to assess considering the lack of floret bases in the carpological record and the impossibility of distinguishing wild and cultivated oats by the morphology of the grains. The single grain from Vila do Touro was found with a wild Poaceae and both are likely weeds. *Raphanus raphanistrum* is a common weed from winter crops (Aguiar 2000). *Rumex* spp. are usually found in several and quite diverse plant formations but *Rumex acetosella* is sometimes found as a weed of winter cereals (Aguiar 2000). Considering millets are spring crops, naked wheat and/or hulled barley could have been cultivated as winter crops. Still, the assemblage of weeds is too scarce to allow secure interpretations.

The presence of a single grape pip (*Vitis vinifera*) in Vila do Touro reinforces the idea that these fruits were already being consumed by local communities since long before Roman contacts. Grape pips have been found in several Iron Age sites in northern Portugal, mostly from the 2nd and 1st centuries BC, when Roman influences cannot be ruled out (Tereso 2012; Tereso and Cruz 2014; Seabra *et al.* 2018, 2020). Still, pips have been recorded in the Chalcolithic levels of Buraco da Pala (Mirandela) (Ramil Rego and Aira Rodríguez 1993) likely documenting gathering of wild fruits. Pips have also been found in the Late Bronze Age levels of Castelo de Matos (Baião) and directly radiocarbon dated. They provided a wide interval that covers the first two centuries of the 1st millennium cal BC (Queiroga 1992), similar to the expected chronology of the seeds from Vila do Touro, considering the radiocarbon dates obtained from grains of wheat and wood charcoal (Table 1). The cultivation of *Vitis vinifera* in Iberia is thought to have begun in Mediterranean Spain during the transition from the 9th to the 8th century BC at the earliest, under Phoenician and/or Greek influence, as investigation from southwest Spain has demonstrated (Pérez-Jordà *et al*. 2017). This would suggest the single seed found in Vila do Touro may not be the result of local cultivation but rather gathering of wild fruits. Interestingly, Carambolo type ceramics and a belt buckle, eventually of tartessic type, suggest contacts with southwest Spain. As such, three hypotheses can be proposed: 1) the grape pip of Vila do Touro is the result of gathering wild fruits, 2) domestic fruits were imported from southern areas (cultivated there or brought from farther areas in the Mediterranean) or 3) local cultivation perhaps of southern influence. The latter two would imply that the chronology of vine cultivation in Iberia is older than is currently accepted, which is too much to suggest based on a single pip. The first hypothesis is, thus, the most plausible, considering the current knowledge.

The absence of hulled wheat must not be overrated, considering we are dealing with few deposits from a single – and small – storage area. It is impossible to evaluate how representative this context is of the crops cultivated and/or consumed by the community that inhabited Vila do Touro during the 9th century BC. *Triticum turgidum* subsp. *dicoccum* (emmer) has been found in Bronze Age and Iron Age sites in northwest Iberia and *Triticum aestivum* subsp. *spelta* (spelt) was introduced in the region during the Iron Age (Tereso 2012; Tereso *et al.* 2013b; Seabra *et al.* 2018; Ramil Rego *et al.*2018; Teira Brión 2019). Together they became dominant crops, surpassing naked wheats in many Iron Age sites, in contrast with other Iberian regions. Even in Northeast Portugal they are predominant at Crasto de Palheiros (Figueiral 2008, Figueiral *et al.* 2017; Leite *et al.* 2018). The predominance of naked wheat in Vila do Touro, however, has parallels in other sites. In fact, recent work was carried out in the lower course of Sabor river valley (Northeast Portugal) where naked wheat predominates at the Early and Middle Bronze Age site of Terraço das Laranjeiras (Jesus *et al.* 2020), as well as in the Late Iron Age levels of Castelinho (Seabra *et al.* 2020) and Quinta de Crestelos (Tereso *et al.* 2018). These easternmost areas of present-day Portuguese territory actually find environmental and cultural affinities with what is presently the Spanish Meseta. The results from Vila do Touro, together with those obtained in the abovementioned sites in the Sabor valley, highlight how problematic the comparisons with the Atlantic areas can be. However, the lack of archaeobotanical studies in the western areas of the Meseta makes broader approaches difficult. Naked wheat predominates more to east in the Meseta, in the middle course of the river Douro/Duero (Delibes de Castro *et al.* 1995), but this archaeological reality is too far and too different. More investigation is necessary in order to properly understand the threshold between Iron Age agriculture dominated by hulled wheat and others where naked wheat predominated, as well as the technological and social implications of such differences.

6. Conclusion

Archaeological excavations carried out at the uppermost platform of Vila do Touro revealed a structure delimited by batholiths and stone alignments but mostly built with perishable materials. Evidence suggests this structure was destroyed by a fire sometime in the 9th century BC, as attested by two radiocarbon dates. This fire allowed the carbonization of some of the wood likely used in the construction of the structure itself. Charcoal analysis revealed wood from deciduous oak was preferred but pine was also used. Evidences of growth suppression suggests tree management which is a particularly relevant issue. Although management of individual trees or shrubs to be used as construction material has been suggested for other Iron Age sites (Carrión 2005; Martín-Seijo and Carrión 2012; Martín-Seijo 2013), anatomical evidences for this are rare in all western Iberia.

Inside this domestic area, a subcircular stone structure was used to keep cereals but faba beans were also found in its surroundings. Other taxa were rare and include a single grape pip, likely documenting gathering of wild fruits. Common millet and naked wheat were the main crops, followed by hulled barley. They were stored together and fully processed, ready for consumption as in other Iron Age sites in western and north-western Iberia. The absence of grains of hulled wheat contrasts with crop assemblages in sites from Atlantic areas, where spelt and emmer are found in great amounts (Teira-Brión 2010; Tereso 2012; 2013; Teira-Brión *et al.* 2016; Tereso *et al.* 2016; Seabra *et al.* 2018; Teira-Brión 2019), but is similar to sites from the Sabor river valley in Northeast Portugal. Whether there is a West-East trend in agricultural choices, is a possibility that needs further clarification. But relevant cultural and environmental differences between the two areas may be key-factors that need to be taken into consideration.

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