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NEW PRODUCTS, NEW TASTES? AGRICULTURAL INNOVATIONS AND CONTINUITIES BETWEEN THE NINTH AND FOURTH CENTURIES BC IN MEDITERRANEAN IBERIA

Summary. The encounters between the immigrant populations of the Levant and the local communities of the south and east of the Iberian peninsula occurring from the beginning of the first millennium led to the transformation of diet and agricultural production. The arrival of new products such as chickpeas and different fruit trees, including in particular the vine, increased the variety and quality of the food consumed. It was at this specific moment that the so-called 'Mediterranean agricultural model' was defined, upon which the identity of the different communities living in this territory was built.

INTRODUCTION

The food that we eat as well as our eating habits and cooking and processing techniques have evolved over time at different rates of change and innovation. Food represents just another element of identity or culture, which despite their apparently static nature, have never ceased being transformed (Dietler 2010).

Among the plant species consumed in the south and east of the Iberian peninsula, some have been around for more than 7000 years, such as wheat (*Triticum* spp.), barley, (*Hordeum vulgare*), lentils (*Lens culinaris*), pea (*Pisum sativum*) and broad beans (*Vicia faba*) (Antolín 2016; Peña-Chocarro *et al.* 2018). Others, however, appeared in this territory in much more recent times. This is the case of several fruits such as the grape (*Vitis vinifera*) and the olive (*Olea europaea*) that began to be cultivated about 3000 years ago (Pérez-Jordà *et al.* 2021), or, for instance, of rice (*Oryza sativa*), a key element of the Mediterranean area, which was documented in Iberia about 1000 years ago. Many of these products have been integrated into our diet and some, such as rice and wine, have become key components of our culinary tradition. On the contrary, other foodstuffs have been abandoned, pointing to the capacity of humans to make choices at any time. These diverse scenarios also show that the situation has never been static, instead there is a dynamic framework in which different plants and plant products are introduced, and others may vanish to later re-emerge in the diet of different communities.

In fact, the introduction of new crops in the human diet does not seem to have followed any uniform pattern. In Iberia, the archaeobotanical evidence points to a number of times when more or

less radical changes occurred. From the arrival of the first farmers in the mid-sixth millennium cal. BC until the end of the second millennium cal. BC, no major changes occurred (Buxó 1997; Peña-Chocarro and Pérez-Jordà 2022). The first great transformation took place at the beginning of the first millennium BC, when seafarers from the Eastern Mediterranean settled in the area and established contacts with the local Iberian communities, leading to a substantial transformation of the local economy, the traditional farming system and, ultimately, the diet (Pérez-Jordà *et al.* 2021). Both local and foreign communities were amalgamated by Mediterranean peoples that had a common agricultural tradition based on the cultivation of cereals and legumes. However, in the Eastern Mediterranean, a first agricultural transformation had already taken place by then, involving the large-scale cultivation of fruit trees (Renfrew 1972; Zohary and Spiegel-Roy 1975; Fuller and Stevens 2019) and the production of some derivatives, such as wine and oil (Brun 2004). These novel products not only transformed the diet but also changed the cooking habits of the local communities.

This paper explores the process of introduction and diffusion of new agricultural products in the south and east of Iberia between the beginning of the first millennium and the fourth century BC. The objective is to define the timing of the changes, explore the exchanges between the different communities and understand their decisions when adopting, rejecting or transforming the new products. The text focuses on agricultural produce, without underestimating the contribution of animal products to these communities. This research is now possible due to the significant development of archaeobotanical investigations over recent decades.

THE ARCHAEOBOTANICAL RECORD

This paper is based on the available archaeobotanical data from publications and reports, as well as unpublished data from the authors' laboratories. There are two important matters that need to be considered: the quality of the record, and the limitations of the available data as a source of information.

Despite recent research over the past two decades that has greatly improved the quality of the archaeobotanical record from Mediterranean Iberia, there are still many questions and doubts related to the history of some plant species and plant products. These can only be fully investigated if strategies for the recovery of plant remains and systematic sampling are implemented on a large scale. In fact, information is still lacking for some areas and some periods, let alone the geographical differences existing across Iberia.

Preservation is also an important issue to consider. Plant remains can survive in different ways in the archaeological record and thus bias the presence/absence of some taxa. Most of the current archaeobotanical material comprises charred seeds, which favours the preservation of cereals, legumes, fruits and oilseeds, but many horticultural species which produce very fragile seeds tend to disappear under charring. In addition, plant parts such as leaves, stems or roots, which are the parts consumed from garden species, are poorly preserved and difficult to determine in any case.

Plant remains can be also preserved in waterlogged contexts. In fact, the number of waterlogged assemblages has also increased in recent years (Pérez-Jordà *et al.* 2017). They generally provide very large batches of material, favouring the presence of fragile taxa not commonly preserved through charring. In contrast, in this type of preservation cereals are more rarely preserved, except for cereal chaff. Finally, mineralization is the least common form of

preservation in Iberia, but among the mineralized material fruit remains such as figs, grapes, apples or pears are common.

WHAT'S FOR LUNCH?

Consequently, what we know about diet and subsistence in the first millennium BC is based on a limited archaeobotanical dataset. Despite the scarce number of archaeobotanical samples, we seek to compare regional assemblages drawn from the three main areas that had a Phoenician presence: the Levant, the central Mediterranean (Tunisia, Sardinia and Sicily) and the Iberian peninsula. We explore the process and timing of different crop introductions.

The Levant

In the eastern part of the Mediterranean, the cultivation of fruits, particularly the olive, the vine, the pomegranate (*Punica granatum*), the fig and the almond (*Prunus amygdalus*) (Zohary and Spiegel-Roy 1975) led to the transformation of the traditional farming system.

Archaeobotanical data from the first millennium BC in the Levant area, both from the Phoenician territory (Badura *et al.* 2016; Orendi and Deckers 2018) and from the surrounding area (Bakker-Heeres and Van Zeist 1973; Neef 1989), are scarce (Fig. 1, Table 1).

As far as cereals are concerned, hulled barley and naked wheats (*Triticum aestivum-durum*) were the main crop species, while hulled wheats played a minor role. Millets (*Panicum miliaceum* and *Setaria italica*), on the other hand, did not appear until the sixth century BC in the Jordan Valley (Neef 1989), although they are identified in biblical texts (see below). The legumes are represented by a significant range of species such as lentil, grass pea (*Lathyrus sativus*), pea, bitter vetch (*Vicia*



FIGURE 1

Sites mentioned in the text: 1. Jiyeh/Porphyreon, 2. Tell el Burak, 3. Tiro, 4. Horbat Rosh Zayit, 5. Tell Keisan, 6. Deir 'Alla, 7. Tell Burna, 8. Althiburos, 9. Karthago, 10. Utica, 11. Motya 12. Sa Osa, 13. S'Urachi, 14. Ibiza, 15. La Vital, 16. Beniteixir, 17. Tossal de les Basses, 18. La Rebanadilla, 19. Castillo de Doña Blanca, 20. Jardín de Alá, 21. Huelva, 22. Castro Marim.

TABLE 1
Taxa present in the different sites

s. BC	Sites	LEVANT					TUNISIA			SICILY		SARDINIA	
		IX Deir Alla	X-VI Jiyeh	VIII-IV Tell el-Burak	IX-VII Tell Burna	IX Utica	VIII-IV Carthage	X-V Althiburos	VIII-VI		XIII-XI Sa Osa	VII-IV	
									Motya				
Cereals													
	<i>Hordeum vulgare</i> subsp. <i>vulgare</i>	X		X	X	X	X	X		X		X	X
	<i>Triticum aestivum-durum</i>	X		X	X	X	X	X		X		X	X
	<i>Triticum dicoccum</i>	X		X	X	X	X	X		X		X	X
	<i>Triticum monococcum</i>									X			
	<i>Triticum spelta</i>									X			
	<i>Panicum miliaceum</i>	X						X		X			X
	<i>Setaria italica</i>							X		X			
Legumes													
	<i>Cicer arietinum</i>	X											
	<i>Lathyrus clymenum</i>			X									
	<i>Lathyrus sativus</i> & sp.	X		X	X					X			X
	<i>Lens culinaris</i>	X		X	X		X	X		X			X
	<i>Lupinus albus</i>							X		X			
	<i>Pisum sativum</i>	X		X	X		X	X		X			X
	<i>Vicia ervilia</i>	X		X	X		X	X		X			
	<i>Vicia faba</i>	X		X	X		X	X		X		X	X
	<i>Vicia sativa</i>	X		X	X		X	X		X			
Fruits													
	<i>Citrus</i> sp.												
	<i>Corylus avellana</i>							pollen					X
	<i>Ficus carica</i>	X	X	X	X		X	X		X		X	X
	<i>Juglans regia</i>												X
	<i>Malus</i> sp.												
	<i>Morus</i> sp.											X	
	<i>Olea europaea</i>	X	X	X	X		X	X		X		X	X
	<i>Phoenix dactylifera</i>												
	<i>Prunus dulcis</i>												X
	<i>Punica granatum</i>	X			X		X	X		X		X	X
	<i>Vitis vinifera</i>	X		X	X		X	X		X			
	<i>Ziziphus</i> sp.												
Oil seeds													
	<i>Linum usitatissimum</i>			X	X		X	X		X		X	X
	<i>Camelina sativa</i>												

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TABLE 1
(Continued)

s. BC Sites	IBERIA								
	SUD			EAST			NORTH-EAST		
	X-VIII	VII-VI	V-IV	X-VIII	VII-VI	V-IV	X-VIII	VII-VI	V-IV
<i>Triticum spelta</i>	X		X	X	X		X	X	X
<i>Panicum miliaceum</i>									
<i>Setaria italica</i>					X	X	X	X	X
Legumes									
<i>Cicer arietinum</i>		X		X					
<i>Lathyrus chymenum</i>									
<i>Lathyrus sativus</i> & sp.									
<i>Lens culinaris</i>		X		X	X		X	X	X
<i>Lupinus albus</i>	cf.								
<i>Pisum sativum</i>	X	X					X	X	X
<i>Vicia ervilia</i>									
<i>Vicia faba</i>	X	X	X	X	X			X	X
<i>Vicia sativa</i>	X			X				X	X
Fruits									
<i>Citrus</i> sp.									
<i>Corylus avellana</i>	X								
<i>Ficus carica</i>	X	X	X	X	X		X	X	X
<i>Juglans regia</i>									
<i>Malus</i> sp.				X		X			
<i>Morus</i> sp.									
<i>Olea europaea</i>		X	X	X	X			X	X
<i>Phoenix dactylifera</i>									
<i>Prunus dulcis</i>									
<i>Punica granatum</i>	X	X			X	X			
<i>Vitis vinifera</i>	X	X	X	X	X		X	X	X
<i>Ziziphus</i> sp.									
Oil seeds									
<i>Linum usitatissimum</i>	X	X		X			X	X	X
<i>Camelina sativa</i>					X				
<i>Papaver somniferum</i>								X	
<i>Anethum graveolens</i>									X

TABLE I
(Continued)

s. BC Sites	IBERIA									
	SUD			EAST			NORTH-EAST			
	X-VIII	VII-VI	V-IV	X-VIII	VII-VI	V-IV	X-VIII	VII-VI	X	V-IV
<i>Apium</i> sp.										
<i>Beta cf vulgaris</i>										
<i>Citrullus</i> sp.	X									
Vegetables and condiments										
<i>Coriandrum sativum</i>			X							
<i>Cucumis melo</i>	X									
<i>Cuminum cyminum</i>										
<i>Foeniculum vulgare</i>										
<i>Lagenaria siceraria</i>										
<i>Nigella sativa</i>										
<i>Sesamen orientale</i>										
<i>Trigonella foenum-graecum</i>										
Wild fruits										
<i>Myrtus communis</i>	X									
<i>Pinus pinea</i>	X	X	X							
<i>Corema album</i>	X									
<i>Prunus spinosa</i>										
<i>Quercus</i> sp.	X	X		X	X	X		X	X	X
<i>Rubus</i> sp.										

ervilia), and broad bean. In addition, chickpea (*Cicer arietinum*), fenugreek (*Trigonella foenum-graecum*) and *Lathyrus clymenum*, are also recorded. Flax (*Linum usitatissimum*) is also attested (Orendi *et al.* 2017), while the opium poppy (*Papaver somniferum*) is absent. Herbs and spices include coriander (*Coriandrum sativum*), cumin (*Cuminum cyminum*), black cumin (*Nigella sativa*) and sesame (*Sesamum indicum*).

A further line of information comes from biblical texts (Borowski 1987), which report several agricultural products and food, some of which are absent from the archaeobotanical record, such as melon (*Cucumis melo*), watermelon (*Citrullus lanatus*), walnut (*Juglans regia*), pistachio (*Pistacia vera*), almond (*Prunus dulcis*), citron (*Citrus medica*), date palm (*Phoenix dactylifera*), carob (*Ceratonia siliqua*), black mulberry (*Morus nigra*), onion (*Allium cepa*), garlic (*Allium sativum*), dill (*Anethum graveolens*) and black mustard (*Brassica nigra*). Some of them have been identified in contexts linked to the Levantine presence in the Western Mediterranean (Sabato *et al.* 2015).

The Phoenician communities of the Central Mediterranean

Plant remains from Phoenician contexts in the Central Mediterranean come from Tunisia and, to a lesser extent, from the islands of Sardinia and Motya (Fig. 1; Table 1). Data from Tunisia come primarily from Phoenician sites such as Utica (Montes *et al.* 2015) and Carthage (van Zeist *et al.* 2001; Kroll 2007), as well as from Numidian contexts in Althiburos (López and Cantero 2016). As at other sites in the Levant, the archaeobotanical record is dominated by hulled barley and naked wheat, with a lesser presence of emmer wheat (*Triticum dicoccum*). However, from the tenth century BC millets and spelt (*Triticum spelta*), a rather unusual cereal in the Mediterranean region, appear. Similarities also extend to the legumes: lentil, pea, bitter vetch and broad bean were the most common species. Chickpea and grass pea are absent, but lupine (*Lupinus albus*) has been identified in both the cities of Carthage and Althiburos.

Flax was present in both Carthage and Althiburos, while poppy and gold-of-pleasure (*Camelina sativa*) seeds, a species absent in the Levant, have been only retrieved in the city of Carthage. These assemblages have also provided horticultural species, particularly herbs and vegetables like melon, dill, celery (*Apium graveolens*), beet (*Beta vulgaris*), fennel (*Foeniculum vulgare*) and sesame. The latter has been only identified in the pollen record.

The archaeobotanical record from Tunisia provides evidence of several cultivated fruits. Some of them are missing from the archaeobotanical record of the Levant, while others are only represented in biblical sources. This is the case of date, found in ancient levels in Carthage (Kroll 2007), jujube (*Ziziphus jujuba*) identified in Althiburos and Carthage, and hazelnut (*Corylus avellana*) and black mulberry (*Morus cf. nigra*) retrieved from Punic levels in the port of Carthage (van Zeist *et al.* 2001).

Plant remains from before the first millennium are non-existent in Tunisia, making clear the difficulty not only of exploring the farming system of the time but also of approaching the study of new crop introductions. It has been suggested that the cultivation of vines could have resulted from internal dynamics, while the presence of other fruit trees such as the pomegranate was most probably linked to Phoenician colonial encounters (López and Cantero 2016). Nevertheless, we need more standardized and homogeneous data from ancient Phoenician contexts as well as from the second millennium BC before firmly establishing the timing of fruit introduction in the area.

Recent research at the site of Motya, in the period between the eighth to seventh centuries BC (Moricca *et al.* 2021), has revealed a very similar farming system focused on the cultivation of naked wheat and hulled barley with a minor presence of hulled wheats, and a variety of legumes (lentil, pea, bitter vetch and broad bean). The vine dominates the fruit assemblage followed by olive, pomegranate and fig. Pine nuts are also abundant.

A similar pattern is also found in Sardinia by the second millennium BC (Ucchesu *et al.* 2015). As in the other regions considered in this study, agriculture is characterized by the cultivation of the same set of cereals and legumes. However, by the last third of the second millennium BC, when contacts with Cyprus are evident (Lo Schiavo 2012), the list of crops was increased by the addition of several fruits such as vines, black mulberry and olives, as well as horticultural crops such as melons at the site of Sa Osa (Sabato *et al.*, 2015). This assemblage is the only one from this period and whether these species spread throughout the island is yet to be determined. There is a gap in the data of several centuries between the thirteenth to twelfth centuries BC and the seventh century BC. Further data from the nearby site of s'Urachi (Pérez-Jordà *et al.* 2020) confirms the same farming system with new adoptions like pomegranate, and after, in Santa Giusta, between the sixth to second centuries BC several new fruit species such as hazelnuts, almonds and plums (*Prunus domestica*), are recorded (Sabato *et al.* 2018).

The south and east of the Iberian peninsula

The number of sites with archaeobotanical studies from the transition between the second and first millennia BC in Iberia is still limited. Most of the data come from the north-east (Albizuri *et al.* 2011) and the east (Pérez-Jordà 2013). Direct evidence of agricultural production suggests that cereals and, to a lesser extent, different legumes, oilseeds, wild fruits and presumably other species, which are less visible in the archaeological record, were the main components of the plant diet. Hulled barley and naked wheat, generally in this order, were the dominant cereals, while hulled wheats such as emmer and einkorn (*Triticum monococcum*) were minor crops. By the end of the 2nd millennium, and only in the inner areas of the north-east (Alonso and Pérez-Jordà 2023), millets are present.

Lentil, pea, grass pea, bitter vetch, common vetch (*Vicia sativa*) and broad bean were the main legumes, and all these were already known in the area at the beginning of the Neolithic (Peña-Chocarro *et al.* 2018). The same situation is observed in the case of flax and poppy, although the presence of these taxa is restricted to just some territories.

There is no clear evidence of fruit cultivation before the first millennium BC. Wild olives, fig trees and vines grow naturally in the Iberian peninsula (Carrión Marco *et al.* 2010), representing an attractive resource for hunter-gatherer groups (Aura *et al.* 2005; Martínez and Badal 2018), as well as for farming communities (Antolín and Jacomet 2014; Alonso *et al.* 2016).

The first colonial settlements on the southern coast of the Iberian peninsula date from the tenth-ninth centuries BC, and from that moment on there is evidence of the introduction of new crops into the agricultural system. Several sites (Fig. 1, Table 1) such as the city of Huelva (Pérez-Jordà *et al.* 2017), Castillo de Doña Blanca (Chamorro 1994) or Jardín de Alá and Rebanadilla (Pérez Jordà 2013) have produced evidence of the diversity of plant products consumed.

The crop pattern is almost identical to the one found earlier in other Mediterranean regions. The main innovation is the presence of millets in southern and eastern Iberia from the ninth to eighth

centuries BC and in Ibiza from the seventh to sixth centuries (Pérez-Jordà *et al.* 2018; Alonso and Pérez-Jordà 2023). The question arises as to whether their spread is associated with the Phoenician presence in the region.

As far as legumes are concerned, the archaeobotanical record indicates continuity with the previous millennium, while the novelties are limited to the chickpea, which has been identified in areas where Phoenicians had settled, suggesting that its introduction into Iberia could be related to contacts with foreign communities.

Flax and gold-of-pleasure are the only oilseeds recorded. The case of gold-of-pleasure is interesting. It appears for the first time in Iberia in the first millennium and it is also documented in Carthage, while absent in the Levant.

The introduction and spread of a significant number of new food plants throughout the first millennium BC transformed the diet of Mediterranean communities. The new fruit species and derivatives such as wine and oil, changed dietary habits, introduced diversity, new tastes and novel techniques. The relative significance of each of the species involved is difficult to assess, however, a steady increase in both the number of remains and their ubiquity (Pérez-Jordà *et al.* 2021) suggests that from the beginning of the millennium fruits became a significant element of the diet. The new products did not emerge gradually, they arrived at once in a package.

We know in some detail the history of these fruits across Mediterranean Iberia. There is evidence of their presence between the tenth and ninth centuries BC in different contexts of the south of the peninsula, and between the eighth and seventh centuries BC they spread northwards and some expanded across the entire area. Grapes and wine spread particularly fast and were adopted in most of the territories; grapes became the main fruit crop in the region by the beginning of the millennium. Other fruits, such as figs and olives, also spread quickly and quite extensively. In contrast, apples/pears, almonds and pomegranates as well as the pine nut have been only identified in the southern part of Iberia. According to current data, differences exist between the fruit species found south and north of the river Ebro and in the frequency of occurrence. Indeed, the presence of fruits is much more significant in the south than in the north (Alonso and Pérez-Jordà 2019).

Interestingly, other than the fruit species, two garden crops have been also found, the melon, which is recorded early in the first millennium, and coriander, which has been identified at Castro Marim in levels dated to the fifth to fourth centuries BC (Queiroz *et al.* 2006). Their limited presence is probably related to the poor preservation of these species in the archaeological record.

WHAT CHANGED?

These new fruit crops travelled from one end of the Mediterranean to the other as part of the interactions and encounters between the indigenous groups and the newcomers. The adoption and later integration of the novelties brought by the Phoenician traders into the traditional farming system eventually led to its transformation. New crops and derivatives and novel agricultural practices profoundly affected the diet of the communities that inhabited Mediterranean Iberia. The coexistence of different food traditions favoured the development of innovations that changed or modified traditional ways of consuming and/or cooking food (Delgado 2010). Bearing in mind that all these elements were part of the cultural identity and customs of the various communities, one can imagine the emergence of a new world resulting from such exchanges and encounters.

All these groups had a common agricultural tradition going back several millennia, when agriculture emerged for the first time in this part of the world. Cereals and legumes were and

continued to be the core of human nutrition. Over the first millennium BC, new food plants were integrated into the traditional subsistence system. Why local communities adopted these new products and how they were integrated into their diet and culture remains to be explored (Dietler 2010). The cereals consumed during the first millennium were identical to those from previous millennia, with the only exception of millets. The extent to which millets modified the indigenous consumption patterns is difficult to evaluate, but these are cereals that are primarily intended for the production of flat rather than leavened breads.

A further interesting topic in this period is milling. Eastern Mediterranean people brought in milling systems based on the to-and-fro movement, which were already being used in the Iberian peninsula (Alonso and Frankel 2017). Alonso (1997) has pointed out, however, that a new type of mill based on the rotary movement was developed by the mid-first millennium, which made it possible to increase productivity. Rather than modifying how cereal was consumed, the rotary mill seems to be a response for the processes of population aggregation. By using mortars and/or to-and-fro or rotary mills, the grain is turned into flour, different types of semolina or groats. In addition, green or dried grains can also be consumed, or cooked to make bulgur or different types of cereal food. In other words, cereal grain can be processed and cooked in different ways, producing a variety of cereal foods (Alonso and Pérez-Jordà 2014). Most recent research (González Carretero *et al.* 2017; Heis *et al.* 2020; Valamoti *et al.* 2021) has revealed the possibility of identifying food fragments, and investigating different processes and ways of food preparation but this type of methodology has not yet been applied to first millennium Iberian material.

No relevant changes have been found in the range of legumes used with the exception of the chickpea whose presence is very limited in Iberia. In general, there are few published studies about in what form legumes were consumed, but it can be assumed that most of them were boiled and eaten whole or consumed in the form of purées.

The main innovation was definitely the integration of fruit plants into the diet. The delayed consumption of fruits required their preservation for future use. Fruits could be dried and stored or they can also be preserved in liquids such as honey or wine. Detecting these practices in the archaeological record is difficult, but there are examples of figs and grapes, which seem to have been dried (Pérez Jordà 2013) (Fig. 2).

Wine was the most successful 'exotic' commodity. Grape remains have been found throughout Iberia and, in some areas the evidence suggests that they were products with a marked commercial orientation (Pérez-Jordà *et al.* 2021). The success of wine goes well beyond subsistence; it had an important role in social, economic and political spheres as well as in rituals and feasts. Its significant socio-economic value resulted in changes in social relations and led to the adoption and/or the adaption of oriental customs of consumption in feasts or acts of commensality (Dietler 1990; Vives-Ferrándiz 2004). At the same time, it played a central role in the articulation of indigenous and colonial encounters.

Determining the reason(s) for the ready and widespread acceptance of wine is a difficult question to answer. Beyond the 'qualities' that tend to be valued, mostly related to its much easier preservation in relation to other alcoholic drinks such as beer, wine has a higher alcohol content and its taste is much appreciated. As an alcoholic beverage, wine shared its place along with other drinks such as beer. It is difficult to establish the percentage of wine in the alcohol intake of these communities and whether this changed over the millennium, whether it was restricted to specific social groups or events and the degree to which it continued to coexist with other alcoholic beverages. Ethnographic data suggests that it is usual for alcohol to account for between 15 and 30% of the diet of communities (Dietler 2010), and Tchernia, for example, estimates that the



FIGURE 2
Dried fig and grape. Scale 1 mm.

consumption of wine in the Roman world would have been about 197 litres per person per year (Tchernia 1986). In addition to wine, there are other grape derivatives, such as vinegar, which certainly played a role, particularly in food preservation.

As has been suggested in the case of the south of France (Dietler 2010), wine and olive oil were undoubtedly the main novelties in the diet of Iron Age groups. The role of olives, the question of whether olive oil replaced the use of animal fats and the possible use of wild olives are all challenging topics. When comparing the number of olive mills documented in Mediterranean Iberia, to that of wine presses, it seems that olive oil played a less important role. Oil mills are not recorded until at least the second half of the first millennium (Pérez Jordà *et al.* 2013). Moreover, olive groves have not yet been identified in the archaeological record, unlike the case of vineyards (Marlasca and López Garí 2006; Vera and Echevarría 2013).

A further element for discussion on the changes that occurred after the entanglement between local indigenous communities and people from the Eastern Mediterranean is the rise of garden plants. Focusing on them and on herbs and spices in particular, there are relevant differences between the archaeobotanical record from Iberia and that from Levant and the Carthage area where several species have been reported. Melon and coriander are the only taxa present in Iberia, even though waterlogged contexts exist. The pattern found in Iberia is, thus, different from that of the Central Mediterranean. The limited presence of horticultural plants, as well as the little diffusion of other novelties, such as the chickpea and the lupine, may have been the result of a process of hybridization by which the local plants continued to have a greater importance. In any case, further work that integrates other elements of the archaeological record is necessary to approach many of the issues that still require elucidation.

DO WE KNOW WHAT AND HOW THEY ATE AND WHO ATE WHAT?

The changes that occurred from the tenth to ninth centuries BC, first in the south of Iberia and later in much of the Mediterranean region, also impacted agriculture and, in general, foodways.

Although our knowledge of this process has improved over the past decades, there are still gaps of both territorial and chronological nature, as well as new questions and concerns that have emerged in the course of our research.

The answer to the first question of the title is affirmative, at least as far as the range of products consumed is concerned. Nevertheless, bearing in mind the limitations imposed by the preservation of plant remains, there are still doubts as to whether or not some of the species currently absent from the archaeological record were used. The application of different methodologies (e.g. isotopic studies) could definitely contribute to a better understanding of their diet, but the problem is that the information obtained is very general, and unable to identify specific plants. And, in the particular case of the area and the chronologies under study, the examples currently available are limited (Fuller *et al.* 2010; Salazar 2011).

The data discussed in this paper may seem at first quite homogeneous. Probably they do not represent the complex picture that certainly existed. We have pointed out differences between the regions such as the absence of chickpeas in some areas or the greater diversity of fruit species as we move northwards, but in any case, the foodscape must have indeed been much more heterogeneous.

Of all the new products, wine was the most desired and consumed. From the beginning of the millennium, amphorae associated with wine transport appear widely distributed in Iberia (Ramon Torres 1995), even beyond the coastal area. Furthermore, grape seeds represent the most abundant and frequent fruit remains in almost all the archaeological contexts located in the east and south of the Iberian peninsula, suggesting perhaps that grapes and wine were commodities for all social classes. In addition, the identification of proper vineyards dedicated to the cultivation of vines such as that of Huelva (Vera and Echevarría 2013), shows the importance and significance that wine enjoyed. However, whether grapes and their derivatives were at any time available just to restricted communities or social groups is unknown as there is still too little data to explore differential access to specific products. The first vines, as well as other new products such as melons or chickpeas, not only appeared in colonial settlements but were also present in indigenous sites located on the coast. We would argue that a larger number of samples from different sites is necessary to explore differences in the products consumed in the various households and confirm or not whether these correspond to social, ethnic or cultural issues, as has been proposed for the Roman world in Great Britain (Livarda 2017). This is an interesting line of research that could be developed in the future, fostering a more detailed approach to recognize diversity within communities.

It has been suggested that wine production was controlled by members of the elite (Vera and Echevarría 2013; Vives-Ferrándiz 2013; Alonso and Pérez-Jordà 2019), at least in some periods. Interestingly, these new products were widely available, whether through acquisition or local production. This situation may have been favoured by the role that the new products played in the construction of new social identities (Delgado 2018).

Knowledge about the diffusion of other commodities such as olive oil is less obvious. The spread of olive oil in the kitchen had an impact on the consumption patterns of the local communities, their food tastes and choices. In the middle of the millennium, oil mills are commonly found in archaeological contexts, but there is no information on the rate of penetration of oil into the indigenous diet. It seems, though, that the process developed faster than in the south of France, where there is no evidence of the import or production of olive oil until very late in the millennium (Dietler 2010).

In the absence of sufficient data on consumption practices it is difficult to discuss how food was processed and prepared. Archaeological information on whether spices, seasonings and flavourings were added to meals to enhance taste and help preserve food is rather scarce. Outside Iberia, there are findings that suggest the use of seasonings in meals. For instance, in Deir Alla (Jordan) a jar with a large quantity of cumin seeds, mixed with fenugreek and grape seeds and a second container with cumin, fenugreek, pomegranate seeds and coriander have been found and interpreted as a kind of herbal vinegar or a curry mixture (Neef 1989). Similarly, in Sardinia finds of amphorae containing meat pieces mixed with grape vines and other fruits in have been reported (Marinval and Cassien 2001; Sabato *et al.* 2018). This is a practice that has been related to methods of meat preservation or simply a way to prepare meat (McGovern 1999).

Approaches to cooking in Mediterranean Iberia have been based on the study of kitchen structures such as hearths and ovens, and cooking pots (Delgado 2010; Belarte *et al.* 2016). No significant changes are found in the kitchen ware used in the first and second millennia BC. Cooking pots associated with stews or boiled food were the most common ceramic forms with almost no variation throughout the millennium (Buxó *et al.* 2010; Iborra Eres *et al.* 2010).

Finally, as mentioned earlier, new methodological developments are providing most interesting information on food preparation and consumption practices through the analysis of burnt food remains. Thus, researchers are providing evidence on food ingredients, processing and cooking activities, as well as final products (Heiss *et al.* 2020; Valamoti *et al.* 2021). These novel techniques have not been yet applied to the first millennium but the potential is enormous for getting a more detailed understanding of the culinary practices of both indigenous communities and foreign seafarers.

CONCLUSIONS

During the first millennium BC, people from both ends of the Mediterranean encountered and interacted in different ways so as to develop a new scenario of complex colonial entanglements with the Mediterranean world. Transformations occurred at different levels (economic, cultural social, political, etc.) impacting also on foodways and agricultural systems. One of the main transformations occurred in diet as new crop species (mainly fruits) were introduced and they and their derivatives were produced and consumed. Wine became the principal product of these encounters, with other fruits and spices having a lesser role.

Despite gaps and silences in the data, the process of adoption of the novel crops and its consequences is starting to become clearer. Following the arrival of the first groups of eastern origin, fruits such as grape, olive, pomegranate, and others as well as their derivatives such as wine and olive oil, were gradually adopted by the local communities and integrated into their foodways. The Levantine agricultural system was not completely transferred into the Iberian peninsula however, and not all crops were equally adopted and integrated. For instance, chickpeas seem to have had very little acceptance according to the archaeobotanical record, while seasonings are poorly represented in western sites. Equally, some local practices relating to cooking (Delgado 2010) were maintained.

The food trajectories of the Iberian indigenous communities during the first millennium were deeply influenced by the encounters with the broader Mediterranean world. Each of these indigenous communities adopted, rejected or transformed the new food products and their associated cooking techniques, creating a very heterogeneous scenario. Our paper has evidenced

the archaeobotanical similarities and differences of the various Mediterranean areas under examination (the Levant, the Central Mediterranean and Iberia). Tunisia, for instance, shows a culinary tradition more closely linked to the Levant. We have also pointed out differences between the Iberian north-east, south-east and south, where the south was the first area where the Levantine novelties arrived, and whence they spread to other areas where they were more widely accepted. In trying to make sense of the similarities and differences of the archaeobotanical data, it is fundamental to take into account the scantiness of evidence and its quality. There are still many points to be clarified and much more archaeobotanical work to be done. We hope that future research will enable us to explore in more detail how these encounters shaped the new farming system, and how foodways were transformed. To that end we trust this paper will encourage the systematic sampling of archaeological contexts to improve our archaeobotanical dataset.

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