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ORIGINAL ARTICLE

Plant gathering and cultivation in prehistoric Tuscany (Italy)

Cristina Bellini · Marta Mariotti-Lippi · Miria Mori Secci · Biancamaria Aranguren · Paola Perazzi

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Abstract This paper presents the first general survey of carpological analyses carried out in archaeological sites in Tuscany (Italy), based on literature and our own research. The data show that with the onset of the Neolithic, naked wheats (*Triticum aestivum/durum/turgidum*), unfortunately not certainly identifiable due to the lack of chaff, different glume wheats (*Triticum monococcum/dicoccum/spelta*) of which einkorn and emmer are certainly identified and barley (*Hordeum vulgare*) play a definite role. Certainly identified specimens of spelt (*Triticum spelta*) and millet (*Panicum miliaceum*) appear in the Bronze Age. The importance of oats is difficult to assess. Beginning in the Bronze Age, an increasing importance of pulses is observed, as in some other parts of Europe. Grape collection seems to be a practice that goes back at least to the Neolithic in Tuscany, while it is not yet clear as to when the appearance of viticulture and wine-making should be dated. The use of cornelian cherry was widespread in the Bronze Age and also continued in the Etruscan period (around 1000 B.C.). However, the available results are scarce and previous identifications may need verification. Corroboration of the data is needed through future systematic research.

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C. Bellini · M. Mariotti-Lippi (✉) · M. Mori Secci
Dipartimento di Biologia Vegetale, Università di Firenze,
Via G. La Pira 4, 50121 Florence, Italy
e-mail: mariotti@unifi.it

B. Aranguren · P. Perazzi
Soprintendenza per i Beni Archeologici della Toscana,
Via della Pergola 65, 50121 Florence, Italy

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Introduction

Very few archaeobotanical investigations have been carried out in Tuscany (Fig. 1), despite the numerous archaeological excavations performed in this region. The earliest papers were published in the first half of the last century, but more comprehensive studies appeared only from the 1990s onwards. With a few exceptions, only lists of findings were published, often with inaccurate nomenclature and performed by scholars that did not have sufficient experience of archaeobotanical investigations. Also a reconstruction of the prehistoric landscape surrounding the settlements is often lacking. More recently, the introduction of the flotation method using small meshes (smallest mesh size 0.3 mm) has led to a significant increase in the quantity and variety of plant remains recovered, these also including small remains that are not generally found at first glance during excavation.

Despite the scarce information available, a general overview of prehistoric plant gathering and cultivation in Tuscany is presented in this paper, beginning with the Upper Palaeolithic and continuing to the onset of the Etruscan civilization around 1000 B.C. In addition, some consideration is attempted of developments in plant use and the introduction of new species/crops.

Materials and methods

An overall assessment of the archaeobotanical investigations carried out in Tuscany is presented here, following

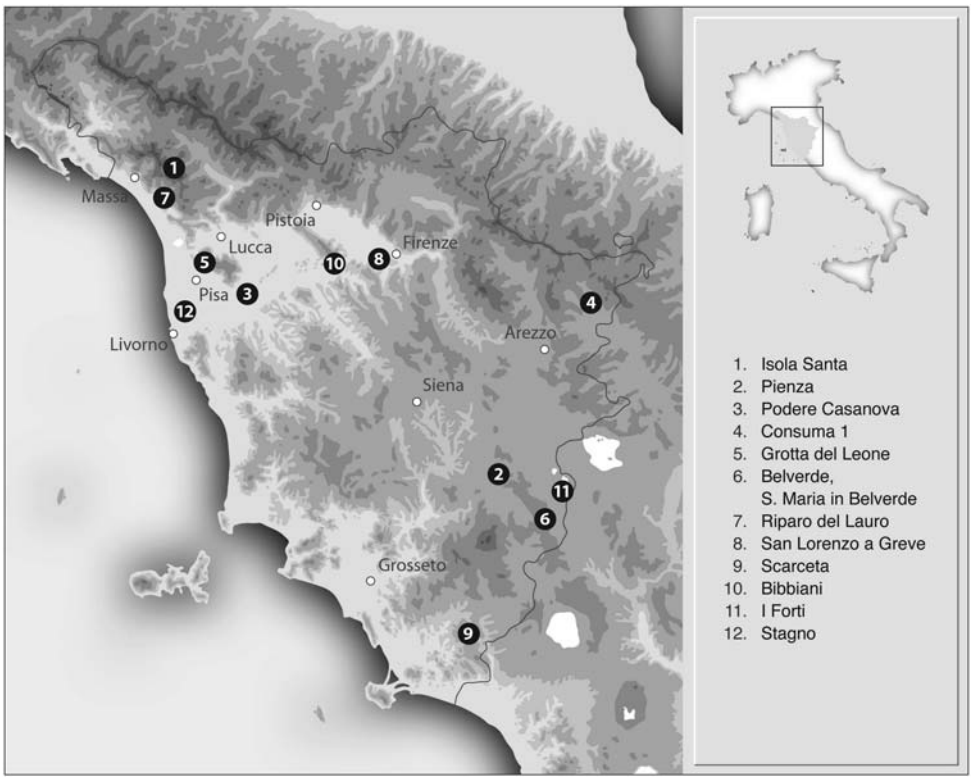


Fig. 1 Map of Tuscany indicating the prehistoric archaeological sites listed in Table 1

some of the guidelines proposed in a recent work by Jacomet (2006). Literature and the results of our own research, some of which is still in progress, have been used. The basic data are shown in Table 1, where the cultural periods, the name of the settlements, their geographical location, and the principal features of the surrounding environment are reported, together with absolute dating when available. The use of the term "settlement" refers to a phase of inhabitation. Respecting the recovery of plant remains, the sampling method (by judgment or systematically, i.e. methodically in cultural layers or along stratigraphical sequences), and the context of the findings are also considered. Finally, where the data are available, the total amount of plant remains recovered and the quantities of cereals are indicated.

The results of the investigation carried out at the Upper Palaeolithic site of Bilancino (northern Tuscany) are not included in the tables because of their different nature. In fact, no carpological remains were found in the layers and the data refers to starch grains recovered from the surface of a grinding stone and the corresponding grinder (Aranguren et al. 2007a).

In Table 2, the list of the plant remains identified in the archaeological sites investigated is reported. Because the terminology used in the literature is very heterogeneous, the original identifications were merged into main taxa. In addition, to obtain insights in the study of agricultural history, we only considered taxa which were most probably gathered and/or cultivated. As to cereals, in almost all the Tuscan sites only caryopses of the taxa were recovered. Thus for instance the distinction of free-threshing wheat at species level is not always reliable (Buxó i Capdevila et al. 1997; Schlumbaum et al. 1998; Nesbitt 2001; Rottoli and Castiglioni 2008). For this reason, all the uncertain identifications were merged under "collective" names.

With reference to the most recent research, correlations with pollen analyses of the same settlement layers or of contemporaneous sediments from the surroundings are attempted. This is the case for the Middle Bronze Age site of San Lorenzo a Greve (SLG-no. 8 in Fig. 1; Tables 1 and 2), which was discovered during construction works for a shopping mall. The study of this site is still in progress. Since it offers new and more comprehensive data concerning the Bronze Age, it is reported in more detail. The site is located within the Arno river plain, in the western periphery of the city of Florence. From a geomorphologic point of view, the area is characterised by alluvial deposits ranging from coarse gravels to fine silty and clayey sediments. During the emergency archaeological intervention, the excavations brought to light a pit which contained pottery dated to the Middle Bronze Age (Aranguren and Perazzi 2007; Aranguren et al. 2007b). This hypogeum structure, carefully lined with clay, is interpreted as a silo. It contained well-preserved (partly even waterlogged, see Table 1) archaeobotanical remains, and offered the opportunity for a direct comparison of the results of pollen

Table 1 List of data for the investigated sites

Period	Settlement	Chronology (years B.C.)	Location in Tuscany	Environment (m a. s. 1.)	Context of the finding	Sampling method	No. of samples	Total volume/ weight	Total seeds/ fruits	Total cereal remains	Preservation	Reference
Mesolithic	Isola Santa (Lucca)	11200–10350	NO (1)	M (500)	Hearth	J	11	–	93	0	Charred	Leoni et al. (2002)
Early Neolithic	Cava Barbieri (Pienza, Siena)		S (2)	H (491)	CultL	S	1	4 l	44	37	Charred	Castelletti (1976)
Middle Neolithic	Cava Barbieri (Pienza, Siena)		S (2)	H (491)	CultL	S	1	4 l	7	4	Charred	Castelletti (1976)
Final Neolithic	Podere Casanuova (Pisa)	4340–4040	NO (3)	P (16)	Pit/hearth	S	7	–	>248	91	Charred	Cellai Ciuffi and Paoli (1984), Mori Secci (1993)
Final Neolithic	Consuma 1 (Arezzo)	3940–3530	NE (4)	P (360)	Hearth	J	?	–	>4	0	Charred	Castelletti et al. (1992)
Final Neolithic	Grotta del Leone (Pisa)		NO (5)	P (6)	Hearth (ritual ?)	J	1	>600 g	>300	>300	Charred	D'Amato Avanzi (1953)
Eneolithic-BA	Belverde (Siena)		SE (6)	M (540)	Hearth (ritual ?)	J	3		Hundreds	ca. 50%	Charred	Oliva (1939a, b)
BA	Cava Barbieri (Pienza, Siena)		S (2)	H (491)	CultL	S	1	4 l	25	19	Charred	Castelletti (1976)
Early BA	S. Maria in Belverde (Siena)		SE (7)	M (540)	CultL	S	1	–	519	190	Mainly charred	Carra et al. (2003)
Middle BA, BM 1-2	S. Maria in Belverde (Siena)		SE (7)	M (540)	CultL	S	2	–	869	197	Mainly charred	Carra et al. (2003)
Middle BA, BM 1-2	Riparo del Lauro (Lucca)	2111–1835	NO (8)	H (185)	Hearth	J	2		386		Charred	Nisbet (1987)
Middle BA, BM 2	San Lorenzo a Greve (Firenze)	1616–1464	N (12)	P (50)	Silo	S	2	1,362 l	3,554	127	Charred/water logged	Study in progress
Middle BA, BM 3	S. Maria in Belverde (Siena)		SE (7)	M (540)	CultL	S	2	–	66	15	Mainly charred	Carra et al. (2003)
Final BA	Scarceta (Grosseto)	1443–1116	S (9)	H (150)	CultL	S + J	13	–	412	7	Charred/ unknown	Rottoli (1999)
Final BA	S. Maria in Belverde (Siena)		SE (7)	M (540)	CultL	S	1	–	9	3	Mainly charred	Carra et al. (2003)
Final BA	Scarceta (Grosseto)	1259–809	S (9)	H (150)	CultL	J	23	–	264	2	Charred/ unknown	Rottoli (1999)
Final BA	Bibbiani (Firenze)		N (10)	H (90)		?	?	–	+	+	Unknown	Balducci and Fenu (2005)

Table 1 continued

Period	Settlement	Chronology (years B.C.)	Location in Tuscany	Environment (m a. s. l.)	Context of the finding	Sampling method	No. of samples	Total volume/weight	Total seeds/fruits	Total cereal remains	Preservation	Reference
Final BA	Forti (Siena)		SE (11)	H (322)	Waste deposit	?	?	–	+	+	Charred	Bettini and Zanini (1993)
Final BA-Early IA	Stagno (Livorno)	1091–1031	NO (13)	P (3)	CultL/ Waste	S	14	1,838 l	7,024	104	Charred/water logged	Study in progress

Period (*BA* Bronze Age, *IA* Iron Age); settlement (name of the site); chronology; location in Tuscany (the numbers correspond to those reported in Fig. 1); environment (*M* mountain, *H* hill, *P* plain); context of the finding (*CultL* cultural layer); sampling method (*J* by judgment, *S* systematic sampling); number of samples; total volume in litres/weight in grams; total number of seeds/fruits; total cereal remains; state of preservation; reference

and seed/fruit analyses. All the soil inside the silo, formed by two fill layers, was floated for macroremains analysis through sieves with a smallest mesh size of 0.3 mm. Archaeopalynological investigations were carried out along a stratigraphic sequence located at the margin of the archaeological site and in the SLG silo fill layers. In this sequence, the lowest layers belong to the Neolithic and the uppermost to Roman times, while the Bronze Age is only represented by a few layers not easily correlated with the silo. Furthermore, the results of the pollen analyses on these Bronze Age levels showed a poor and degraded pollen content, typical of highly disturbed anthropogenic soils.

Results and discussion

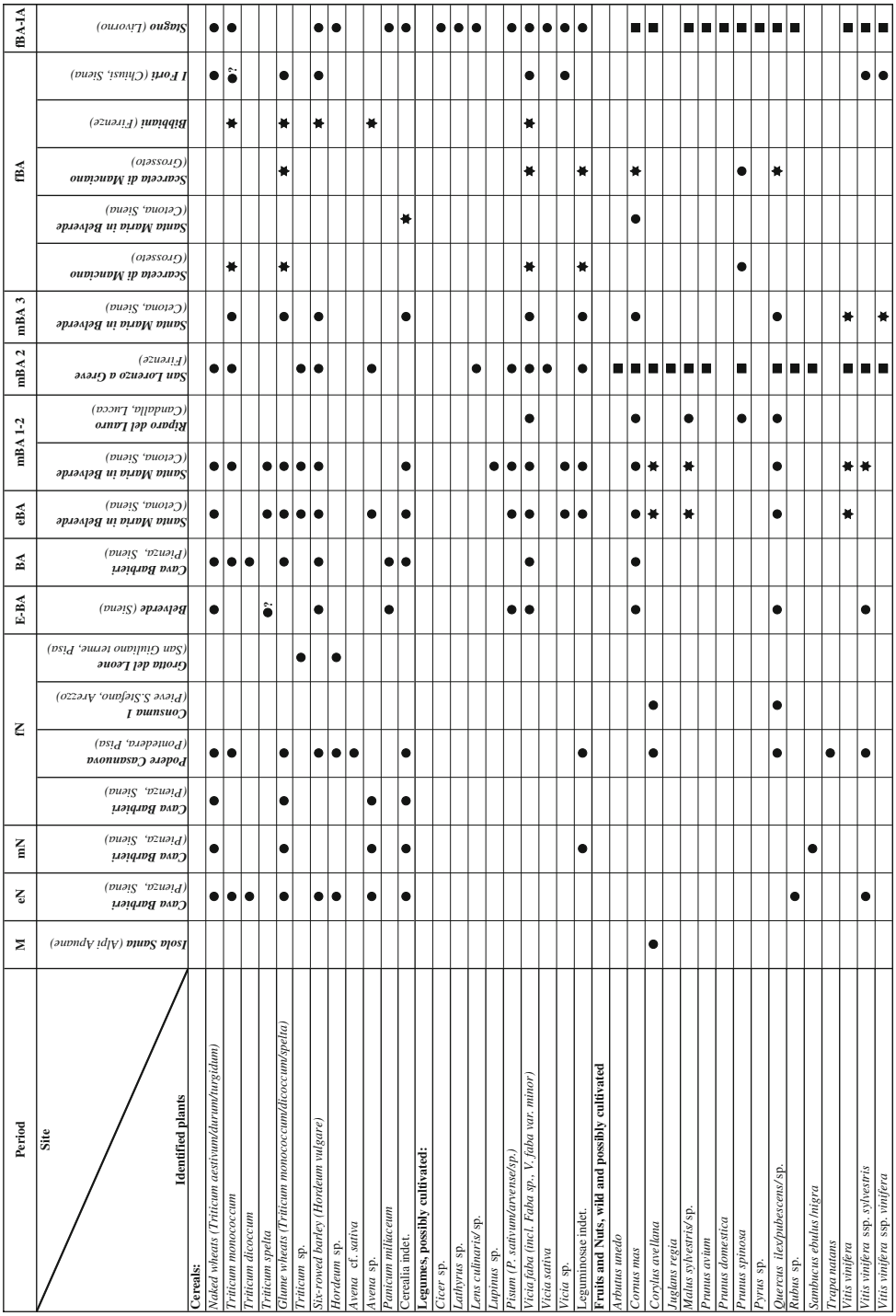
General

A general survey of the Tuscan settlements that include archaeobotanical studies is presented in Table 1. The geographical distribution of the sites (Fig. 1) is not homogeneous, but shows a concentration in the Arno river valley, the flatland area in Northern Tuscany. Most sites are represented by only one inhabitation phase, while others include more settlement phases (Table 1). Monte Cetona (no. 6 in Fig. 1; Belverde and S. Maria in Belverde) is the investigated area with the most numerous inhabitation phases, which document the long frequentation of the place from the Late Neolithic until the end of the Bronze Age. The overall scarcity of archaeobotanical investigations in prehistoric sites is evident, the most numerous studies belonging to Bronze Age sites.

The context of the recoveries should be noted. This mainly consists of hearths in the Neolithic-Eneolithic sites, while in the Bronze Age settlements the carpological remains were prevalently found in cultural layers. This situation may be related to the different taphonomic conditions of the sites, but also to the different archaeological excavation strategies and also the different archaeobotanical sampling methods. For instance hearths are easily favoured in sampling by judgment (Table 1).

The findings of seeds and fruits in the various settlements are listed in Table 2. Here, only the presence is reported. In fact, the direct comparison between the numerical amount of plant remains in the different settlements is hazardous because of the different contexts of the findings (hearths, ritual offerings, waste deposits), the different states of preservation (charred or waterlogged), the possible damage (loss of data) caused by the various procedures in sieving, as well as the different sample sizes and numbers. Moreover, information about this sort of data is totally lacking in many papers.

Table 2 List of the gathered and/or cultivated seeds and fruits recovered at the investigated sites



M Mesolithic, *N* Neolithic, *E* Eneolithic, *BA* Bronze Age, *mBA* middle Bronze Age, *IA* Iron Age, *e* early, *m* middle, *f* final, *filled circles* charred; *filled squares* waterlogged; *filled stars* state of preservation unknown. References are reported in Table 1

Palaeolithic and Mesolithic

Data from the literature do not offer the possibility of discussion of plant gathering during the Palaeolithic. The research carried out at the Upper Palaeolithic site of Bilancino provided indications of the ability to process plant material rather than information about plant diet (Aranguren et al. 2007a). The Bilancino site, which dates to within the Gravettian period (30000 cal. year B.P.), is interpreted as a summer camp located near a damp/swampy environment. The occupation phase coincides with a cold period with sparse woods and widespread wetlands (Mariotti Lippi and Mori Secci 2002; Aranguren et al. 2003). The archaeobotanical investigation revealed the presence of starch grains on the surface of a grindstone. This showed the ability to produce flours of vegetal origin from different

plants (most certainly *Typha* and Gramineae (cf. *Brachypodium*)) and the ability to prepare food like flat bread or porridge (Aranguren et al. 2007a).

The data regarding the Mesolithic are also extremely scarce, being confined to few charred hazelnuts found at Isola Santa (no. 1 in Fig. 1) in the Apuan Alps (Leoni et al. 2002).

Neolithic

Many Neolithic and Eneolithic (Copper Age) sites were excavated in Tuscany, but archaebotanical analyses were only occasionally carried out (Tables 1, 2). At the sites where seeds and fruits were studied, it is possible to note the regular presence of crops, particularly cereals, in addition to gathered plants.

The list of the cereal "taxa" mentioned in the literature is long. The different identifications of e.g. naked wheat as *Triticum compactum, T. aestivum, T. durum* or *T. sphaerococcum* are generally to be considered 'working terms', as suggested by Jacomet (2006); therefore, they were compiled in the group "naked wheat" in Table 2. In fact, because of the lack of chaff, the detailed identifications are not totally reliable. An exception is the research carried out at the Early Neolithic settlement of Pienza (Castelletti 1976) where chaff was also recorded and *Triticum monococcum* and *T. dicoccum* were identified.

All in all, the analyses suggest that since its appearance, *Triticum* is represented in Tuscany by caryopses of different morphologies, which suggests the contemporary presence of various species belonging to glume and free-threshing wheat. The coexistence of different morphologies of grains was also found in Neolithic Northern Italy (Rottoli 2000; Rottoli and Castiglioni 2008) and other parts of Europe (Colledge and Conolly 2007). Barley (*Hordeum*, probably different types) and oat (*Avena*, whether wild or domesticated is uncertain) were also found in Neolithic contexts, in particular in Podere Casanuova (no. 3 in Fig. 1) and other Neolithic sites near Pisa and Siena (Table 2).

Some taxa of wild plants with edible fruits, which were presumably available in the surroundings of the sites, have also been recovered, although the preservation was generally bad (only charred remains present) thus leading to an underrepresentation, mainly of fruits, in the deposits (e.g. van der Veen 2007). Gathered fruits and nuts might, therefore, have had more significance than indicated in this record. The importance of gathered plants in the Neolithic and Eneolithic diet was recently pointed out by Rottoli and Castiglioni (2008) in their overview of the archaeobotanical studies in Northern Italy.

An interesting find in Tuscany is water chestnut (*Trapa natans*) which was recovered from a hearth in Podere Casanuova (Table 2). Water chestnut is also indicated at other Italian Prehistoric sites (Castiglioni et al. 1998; Costantini 2002) and at several Neolithic and Bronze Age wetland sites in Southern Germany (Karg 2006). Together with many other wetland species, water chestnut is now infrequent in the lower Arno river valley, but in the past wetlands were more widespread in the area where Podere Casanuova is located, as suggested by the pollen analyses carried out in the middle and lower Arno valley (Bernabei et al. 1985; Birtolo and Foggi 1990; Mariotti Lippi et al. 2007a). From the Neolithic to the Bronze Age, these off-site pollen analyses testify to a landscape characterised by scarce woodlands, as occurs on very damp soils. Furthermore, the openness of the landscape could also be a consequence of the clearance practices attested by on-site anthracological studies of hearths (Abbate Edlmann et al. 1993, 1997).

Bronze Age

Carpological remains from settlements dating to the Bronze Age are the most abundant. At the site of San Lorenzo a Greve, the pollen analysis from the margin of the archaeological site revealed the consequences of human activities in the area beginning with the Neolithic and continuing up to the Roman period. In particular these consequences were a decrease in dampness through drainage practices evidenced by canals and the appearance of anthropogenic indicators, absent in the oldest, non-occupation layers.

In the carpological list for the silo layers, cultivated plant remains, mainly cereals and pulses, were found in a charred state, while the more abundant gathered wild fruits/seeds, mostly cornelian cherries and grapes, were waterlogged and recovered in good state of preservation. This differential preservation state of the remains is also recorded from the coastal pile-dwelling site of Livorno-Stagno, another recently studied Tuscan Bronze Age waterlogged settlement (Abbate Edlmann et al. 2008) and from other parts of Italy (Bandini Mazzanti and Taroni 1988; Castelletti et al. 2001) and Europe (e.g. Jacquat 1988, 1989; Jacquat and Martinoli 1999; Bouby and Billaud 2005).

A large number of grape (*Vitis vinifera* s.l.) pips were recovered from the top fill layer of the silo, the majority of which are attributed to the wild form, ssp. *sylvestris*. In San Lorenzo a Greve, the attribution of some pips to the ssp. *vinifera* is based on the biometric and morphological indexes in the literature (Stummer 1911; Mangafa and Kotsakis 1996; Jacquat and Martinoli 1999). However, some authors have noted that the morphometric parameters of the pips commonly used to separate the wild from the cultivated subspecies are not totally consistent (e.g. Castelletti et al. 1998; Mori Secci 2005; Scienza 2005; Mercuri

et al. 2007a). Nevertheless, there seem to be hints of the presence of the cultivated form (ssp. *vinifera*) at other Bronze Age sites in Tuscany (Table 2), and in the Emilia Romagna region (Ammerman et al. 1976 in Forni 1979; Bandini Mazzanti and Taroni 1988). It should also be noted that in San Lorenzo a Greve no small (underdeveloped/abortive) pips typical of the cultivated grapevine (Kroll 2000) were found among the numerous pips, which is a further suggestion of the prevalence of wild forms stored in the silo.

The comparison between the pollen and seed/fruit records from the fill layers of the silo shows that many wild plants belonging to the surrounding vegetation occur in both datasets (e.g. deciduous *Quercus*, *Acer*, *Ulmus*, *Corylus*, *Vitis*). Thanks to this, some observations regarding the choice in plant gathering and the habitats exploited can be made. The nearby river woodlands were frequented for cutting and gathering timber, as also indicated by the identification of the remains of manufactured wooden items (interpreted as ladders) in the silo (e.g. *Ulmus* and *Sorbus*), and for collecting food and/or fodder (Bellini et al. 2007). Fruit from grapevines, whose pollen percentage is low while the presence of pips is high, could have also been collected in these damp forests.

As to cereals, wheat (mostly naked, based on macroremain identifications) and barley are represented by both pollen and charred caryopses while no chaff was found. Generally, the recovery of charred caryopses alone is typical of grain storage deposits (Harvey and Fuller 2005), which would be in accordance with the archaeological interpretation of the structure as a silo. However, the concentration of caryopses is very low (Table 1) and therefore it is not possible to completely exclude their simply representing "background noise". The finding in the upper fill layer of a significant percentage of cereal pollen grains, often found clumped and in a good state of conservation, may have different interpretations. On the one hand there might have been cereal fields in the immediate surroundings of the site, since cereal pollen has a low air-borne diffusion (e.g. Hall 1989; Mercuri et al. 2007b). On the other hand, there might have been a threshing area nearby, since this practice can form cereal pollen grain accumulations, together with abundant chaff remains. However, it was not possible to verify these hypotheses because only a part of the Bronze Age settlement was available for excavation. The finding of weeds in both records (e.g. pollen grains of *Rumex*, *Centaurea* cf. *cyanus*, *Papaver* etc., and small seeds of Polygonaceae) might suggest the presence of cereal fields in the surroundings of the site and/or their introduction in the pit together with the stored material.

Other well represented cultivated plants in the silo were the pulses, among which the lentil (*Lens culinaris*) was the most abundant. Together with lentils, broad beans, peas and chickpeas were present. Generally, an increasing variety of pulses in the Bronze Age settlements as compared with the Neolithic ones is noticeable (Table 2), although a bias caused by the scarce data for the Tuscan Neolithic should not be excluded. This trend is also observed in the Alps (e.g. by Jacomet et al. 1998), while in Northern Italy a high variety of pulses was already present in the Neolithic (Rottoli and Castiglioni 2008).

Among the gathered fruits and nuts, grape pips and cornelian cherry stones are the most abundant, forming together more than half of the total seeds/fruits. The contemporary recovery of grapes and cornelian cherry is frequent in Italian Bronze Age sites, and these remains have been interpreted as being ingredients for the preparation of fermented drinks (Forni 1990; Bandini Mazzanti et al. 2005). The recovered pips do not show signs of processing, and no other parts of the grape bunch were found, such as grape-skins attached to the grape-pips suggesting pressing (Valamoti et al. 2007). In general the finding of only the pips of *Vitis* is interpreted as a indication of whole grape or raisin consumption (Margaritis and Jones 2006). Furthermore, no archaeological proof of alcoholic beverage production was found, thus leaving considerable doubt as to the use of these plants.

In Northern Italy, an inversion in the relative use of cornelian cherry and grapes for fermented drink preparation was interpreted as a consequence of the cultural shift from cornelian cherry wine to grape wine at the transition from the Bronze to the Iron Age (Mercuri et al. 2007a). In Tuscany, the coexistence of grapevines and cornelian cherry is also maintained after Prehistory, as evidenced in an Etruscan farm (6th century B.C.) located in Pian d'Alma, near the southern Tuscany coast (Mariotti Lippi et al. 2003). Pollen analysis showed that the farm was situated in a woodland clearing and the carpological investigation revealed cereals, in particular barley and wheat, different pulses, some certainly cultivated, and fruits gathered in the woods. At this site, the presence of cornelian cherry, whose occurrence in the surrounding woods is shown by pollen analysis, is associated with facilities that point to cornelian cherry wine-making (Paribeni 2001).

Other interesting findings in the pit are remains of *Juglans regia* and *Prunus avium*. Nutshells of *Juglans regia*, were already present at Neolithic sites in Northern Italy (Rottoli and Castiglioni 2008), while its pollen is recorded from ca. 5800 cal. B.P. in a core in N Tuscany (Mariotti Lippi et al. 2007b), in an Eneolithic (Copper Age) site near Florence (Birtolo and Foggi 1990), as well as in a Bronze Age site in the Emilia Romagna region (Mercuri et al. 2007a). Therefore, one can conclude that *Juglans* must have been present in Italy since (early) Neolithic times.

Prunus avium stones are present in Northern Italy in the Neolithic (however, the attribution is doubtful), in the Chalcolithic (Rottoli and Castiglioni 2008) and in the Bronze Age (Mercuri et al. 2007a) when also *P. domestica* stones are found. In our data *P. domestica* only appears in the transition horizon from the Bronze to the Iron Age (Table 2).

Conclusion

Even though the archaeobotanical information for Tuscany is still extremely scarce, it does offer some insights on the variation in plant use during the prehistoric periods.

Cereals must have played an important role in the prehistoric subsistence strategy and in the archaeobotanical record they are always represented by different taxa. The data show that in Tuscany, with the onset of the Neolithic, naked wheats (*Triticum aestivum/durum/turgidum*), different glume wheats (*Triticum monococcum/dicoccum/spelta*), and barley (*Hordeum vulgare*) play a definite role; all of them coexisted also in the Bronze Age. However certainly identified specimens of spelt (*Triticum spelta*) and millet (*Panicum miliaceum*) appear only in the Bronze Age. The importance of oats is hard to assess.

The low quantity of cereal macroremains from the Late Bronze Age sites (Table 1) may be a consequence of an increasing use of the naked wheats which can be underrepresented in the archaeobotanical record (Boardman and Jones 1990). Moreover, naked cereals are not processed by parching (Harvey and Fuller 2005), which may be a further explanation for their rare survival of degradation. The hypothesis of the increasing importance of naked wheats might be confirmed by future findings of chaff or other remains indicating processing practices. Unfortunately, this kind of proof is not presently available from the Tuscan archaeological sites. In general, however, a weaker signal of naked grain with respect to hulled grain processing practices (by-products), particularly threshing, is common within settlement contexts (e.g. Maier 1999). A quantitative and qualitative variability in the archaeobotanical evidence of cereal grain cultivation and processing was observed in Neolithic settlements around Europe (Peña-Chocarro et al. 2005; Valamoti 2005; Colledge and Conolly 2007). Nevertheless in Tuscany the restricted archaeobotanical record and settlement context biases hinder the present-day possibility of decoding general trends in cereal cultivation.

Beginning in the Neolithic and mostly during the Bronze Age, the data suggest that more species of pulses seem to appear, perhaps in connection with a cultural shift towards a higher diversity of the Bronze Age diet (Table 2).

The findings of "food remnants" consisting of flour lumps, caryopses and whole or fragmented legume seeds at a Bronze Age site in Southern Tuscany testify to the use of a mixture of cereals and pulses in the human diet (Rottoli 1999).

Among the wild and possibly cultivated fruits and nuts, the greater part of the grape pips recovered in the Tuscan Bronze Age settlements are attributed with certainty to wild forms; however, they are accompanied by pips of different morphologies, including those of the cultivated subspecies and intermediate forms. According to Forni (2005) the findings in Central Italy of the possibly cultivated subspecies in the Middle Bronze Age can be correlated with data coming from Southern Italy where indigenous viticulture is hypothesised. Nonetheless, the morphological characters of the pips do not provide sufficient information to determine whether this variability is the consequence of the beginning of grapevine domestication, or of the introduction of allochtonous vines. More information might come from DNA analyses of grapevine pips belonging to the different archaeological sites. Once more, it should be stressed that in these settlements no wine-making facility was recovered, thus reducing the possibility of hypothesising the presence of this practice in prehistoric Tuscany. What is only certain, therefore, is the importance of grapes in the diet since pips are generally abundant within the carpological records, particularly in the Bronze Age sites.

Finally, in order to make convincing palaeoethnobotanical interpretations and, in general, to gain a more comprehensive understanding of prehistoric farming practices and diet habits, integration of the results of seed/fruit analyses with those of archaeopalynological analyses was carried out where possible, and proved to be useful. This approach will, therefore, be attempted in detail in future studies.

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