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# Evidence of a short-lived episode of olive (*Olea europaea* L.) cultivation during the Early Bronze Age in western Mediterranean (southern Italy)

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**Abstract**

Anthracological analysis was carried out in the archaeological site of Punta di Zambrone on the Tyrrhenian coast of Calabria in southern Italy. Archaeological excavation documented at the site settlement deposits dated mainly to Early Bronze Age (EBA, 21st–18th century BC) and the Recent Bronze Age (RBA, 13th to early 12th century BC). In the phase of the EBA village, the high frequency of *Olea europaea* in the charcoal data suggests the tree may well have been cultivated by favouring the spread of the scant olive trees growing wild. Comparison with existing archaeobotanical data indicates that olive cultivation spread over a large portion of southern Italy from the EBA and the early Middle Bronze Age (MBA, 17th–15th century BC), thus calling into question the hypothesis of its first cultivation related to the interaction between Mycenaean Greece and local cultures in southern Italy. The early domestication event at Punta di Zambrone supports the idea of multiple independent primary events of olive domestication throughout the Mediterranean basin. In the following phase of the fortified settlement dated to the RBA, the frequency of olive charcoal diminished and the expansion of a more or less dense forest dominated by *Quercus* was judged to be a consequence of human depopulation that characterises the end of MBA and also a different land use of RBA. This forest increase, also recorded by other archaeobotanical proxies in the central and southern Italian peninsula, is found to be related to the diffusion in southern Calabria of the *Subapennine* culture, spreading from more northerly areas of Italy and bringing different economic systems and agronomic knowledge. These far-reaching changes appear to have brought to a halt the first event of olive cultivation recorded at Punta di Zambrone.

**Keywords**

Bronze Age, charcoal analysis, fuel wood, Mycenaean influence, *Subapennine* culture, Tyrrhenian Calabria coast, vegetation cover change

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## Introduction

The wild olive (*Olea europaea* L. subsp. *oleaster* (Hoffm. & Link) Hegi) is a long-lived evergreen sclerophyllous tree, inclined to form clonal populations and to be light-demanding and drought-tolerant (Lo Gullo and Salleo, 1988), spreading in the thermo-Mediterranean belt between 41°N and 39°N, moving from west to east in the Mediterranean basin (Ozenda, 1975). The wild olive constitutes the ancestor from which the modern varieties of cultivated olive (*O. europaea* L. subsp. *europaea*) have been obtained through a long history of domestication and cultivation. Indeed, the olive belongs to the first group of domesticated trees, presumably because of its easy vegetative reproduction by the rooting of basal knobs and cutting (Zohary and Hopf, 2000). At the present day, the olive is widely cultivated both for fresh table fruits and oil production throughout the terraced coastal and inland slopes of the Mediterranean basin, causing the species to spread beyond its natural range both in elevation and latitude (Quézel and Médail, 2003).

Extensive research has been carried out to fill the gap in our knowledge about the origin and natural distribution of wild olive populations, as well as the nature and timing of its domestication. So far, both archaeobotanical evidence (Carrión et al., 2010; Rodríguez-Ariza and Montes Moya, 2005; Terral et al., 2004; Zohary and Hopf, 2000; Zohary and Spiegel-Roy, 1975) and above all molecular analysis (Besnard and Bervillé, 2000; Besnard et al., 2002; Breton et al., 2006, 2009; Lumaret et al., 2004) have shed light on the history of this iconic Mediterranean tree. However, several gaps in our knowledge and conflicting interpretations of domestication/cultivation and on the origin of present-day cultivars have emerged.

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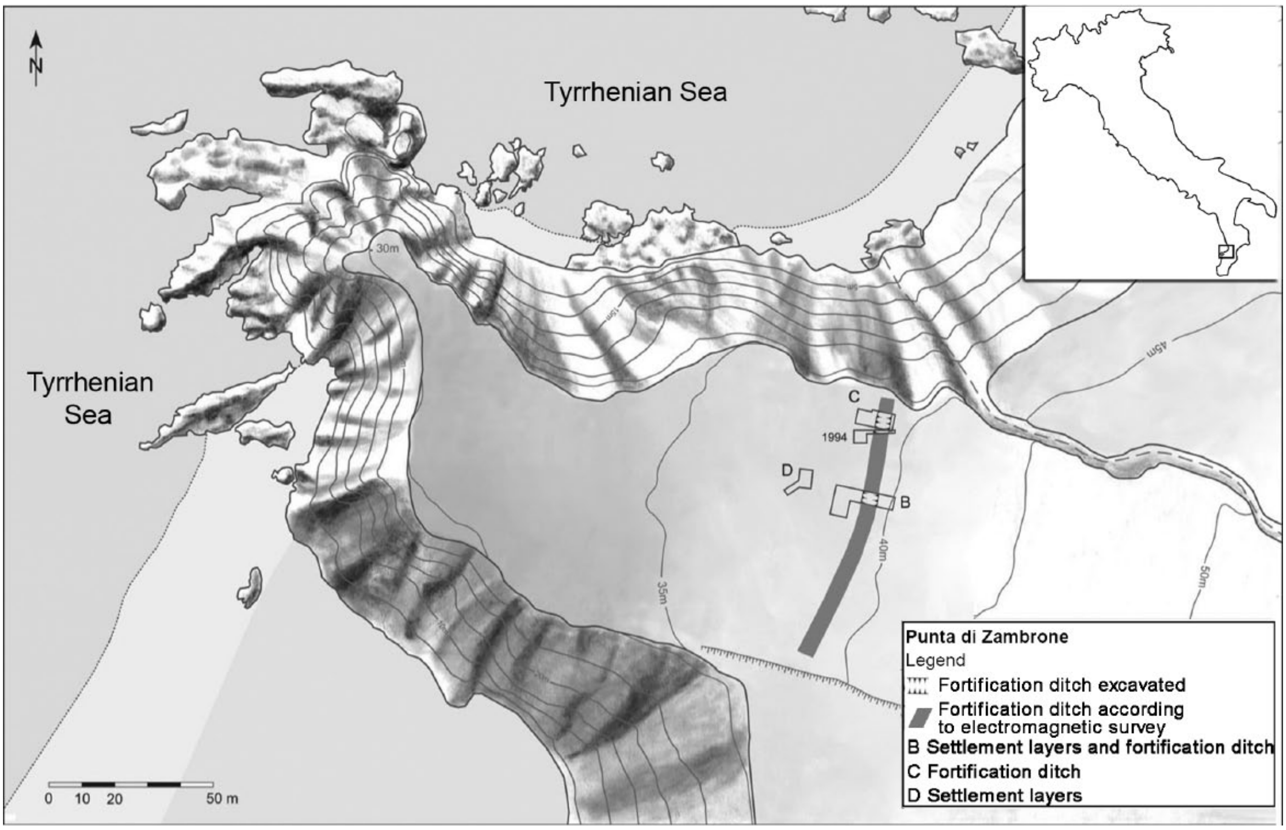


**Figure 1.** Location of the study site and detail of the excavation area.

Drawing upon archaeobotanical evidence, several authors refer to olive cultivation starting ~6000 BP in the Near East (Brun, 2003; Liphschitz et al., 1991; Van Zeist, 1980; Zohary and Hopf, 2000) and suggest later diffusion from the East to the West of the Mediterranean basin by cultural contacts and/or human migrations. For example, according to Van Zeist (1980), olive cultivation gradually spread from East to West, carried by the Phoenicians, Etruscans, Greeks and then Romans, being first developed in Greece around 2500 BC. However, the existence of one or more domestication events in the Mediterranean region is also a matter for debate, and recent genetic studies propose a multiple origin of cultivars across the Mediterranean area. It remains unclear whether this reflects secondary diversification or multiple independent primary events (Baldoni et al., 2006; Belaj et al., 2012; Besnard and Bervillé, 2000; Besnard et al., 2001, 2002, 2007; Breton et al., 2009; Diez et al., 2015; Trujillo et al., 1990).

With regard to the Italian peninsula no specific archaeobotanical study has so far focused on olive cultivation/domestication. Often, archaeologists have hypothesised that the first cultivation of the olive should be related to the interaction between Aegean and local southern Italian cultures in the second half of the 2nd millennium BC (Brun, 2010). Indeed, according to Bergonzi (1985) and Peroni (2004), the close contact with the Mycenaean world not only allowed local inhabitants to produce Aegean-like pottery but it is probable that these peoples also introduced familiarity with the technology of olive oil and perhaps wine production.

The aim of this work was to contribute to the history of olive cultivation especially in the context of southern Italy, using archaeological charcoal (charred wood) data which have a good resolution both in space and time. A good match with the cultural history of human populations can be made because charcoal originates directly from human activities (Chabal et al., 1999).

In this context, we present charcoal data from the archaeological site of Punta di Zambrone (Italy, southern Tyrrhenian coast; Figure 1) dated to the Early Bronze Age (EBA) and the Recent Bronze Age (RBA). Furthermore, the vegetation changes recorded in this area during a period of 1000 years between the EBA and the RBA are discussed with emphasis upon the role of human communities.

## The archaeological site and the research project

The Bronze Age site of Punta di Zambrone (38°42′53″N, 15°58′20″E) was discovered in 1991 by Marco Pacciarelli and colleagues during an archaeological survey carried out in the wider region of the Poro (or Tropea) peninsula, that allowed complete reconstruction of the settlement history during the Metal Ages.

During the Copper Age (starting from 3700/3600 BC), the communities were concentrated mainly on the fertile soils of the Poro highplain (600–700 m a.s.l.) at the summit of the Poro peninsula. In the EBA (21st–18th century BC), the occupation of the highplain continued, but several settlements spread in the lower hills and terraces towards the sea. The earliest Middle Bronze Age (MBA 1 and 2; 17th–15th century BC) saw the abandonment of the plateau and a marked preference for naturally defended positions. During this period, contacts with the Aegean World began. With the transition to MBA 3 (14th century BC), few well-fortified sites survived. In the RBA (13th–12th century BC), a new complex territorial organisation flourished, comprising non-defended sites on the highplain, defended inland sites and coastal sites suited for maritime activities.

The best example of this last category is Punta di Zambrone (~11,100 m$^2$; Figure 1), an elongated promontory jutting into the sea. It allows extensive visual control of the southern Tyrrhenian Sea, ranging from Sicily and the Aeolian Islands to the Calabrian coast. The Bronze Age settlement occupied the upper flat part, gently sloping towards the outer cape. On the two longer sides, it was defended by high cliffs, and only on the western side remained

**Table 1.** Summary of the main characteristic of the sampled layers.

| Chronology and cultural periods | Excavation area | Sampled layers (code) | Archaeological structure | Analysed charcoal (count) |
|---|---|---|---|---|
| 13th to early 12th century BC, Recent Bronze Age | C | 66 | Filling of a moat | 254 |
| 19th–18th century BC, Early Bronze Age 2 | B | 86, 166, 191 | Settlement levels | 200 |
| 21st century BC, Early Bronze Age 1 | D | 192, 197 | Settlement levels | 106 |
| | | | Total | 560 |

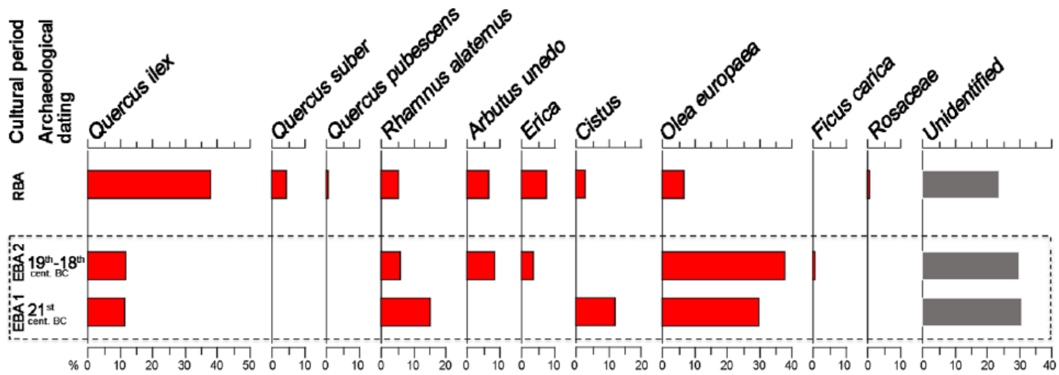


**Figure 2.** Results of charcoal analysis according to dating and taxa. Frequencies (in %) are calculated from the total number of charcoal fragments in each chronological phase.

accessible. This side was fortified, at least during the RBA, by a defensive ditch associated to a wall or an earthwork.

From 2011 to 2013, an international project of archaeological excavation and research was carried out and directed by Reinhard Jung and Marco Pacciarelli at the site of Punta di Zambrone. The excavations investigated layers and structures dating from the 21st to the early 12th century BC in three different areas (B, C and D).

## Features of the sampling areas

Area D (Figure 1) of the prehistoric settlement yielded layers of an initial phase of the EBA (EBA 1) dating to the 21st century BC. In the western part of Area B (Figure 1), an elongated, shallow rock-cut structure and an adjacent use level with fire places came to light. These features belong to the developed EBA (EBA 2), dated by $^{14}$C to the 19th and 18th centuries BC. In Area C, the excavations revealed part of a fortification ditch filled with ash layers rich in local RBA artefacts and coeval Mycenaean pottery (Figure 1). This last settlement phase can be dated mainly from the 13th to the early 12th century BC.

## Materials and methods

Archaeological sediments from six stratigraphic units coming from the three excavations – Areas D (EBA1, 21st century BC), B (EBA 2, 19th–18th centuries BC) and C (RBA, 13th to early 12th centuries BC) – were sampled for charcoal analysis (Table 1). The contexts were carefully selected among those containing scattered charcoal, dispersed by long-term activities and processes following Chabal (1997) and Figueiral and Mosbrugger (2000). Charcoal fragments are referable to their use mostly as fuel in domestic activities.

The sediment samples were floated and sieved on a sieving column with 4, 2, 1, and 0.5 mm meshes to recover charcoal fragments and other archaeobotanical remains currently under study. All the fragments over 4.0 and 2.0 mm were identified by an incident light microscope working between 100× and 1000× magnification, consulting both wood atlases (Abbate Edlmann et al., 1994; Greguss, 1955, 1959; Schweingruber, 1990; Vernet et al., 2001) and the charcoal reference collection at the Laboratory of Vegetation History and Wood Anatomy at the University of Naples Federico II. Taxon percentages (Figure 2) were calculated from all the analysed charcoal in each of the three chronological phases/excavation areas (Table 1).

## Results

In all, 560 charcoal fragments were analysed (Table 1) and 11 taxa were identified. The results are presented according to the different chronological periods (Figure 2).

### *EBA 1 (21st century BC)*

These charcoal data concern the first settlement phase. *O. europaea* (31%) is the most represented taxon, followed at some distance by *Quercus ilex* (11%), *Rhamnus alaternus* (16%) and finally *Cistus* (11%). It should be pointed out that in the case of *O. europaea*, wild olive (*O. europaea* subsp. *oleaster*) is indistinguishable from its cultivated counterpart (*O. europaea* subsp. *europaea*) on the basis of wood anatomy (Abbate Edlmann et al., 1994; Greguss, 1959; Schweingruber, 1990; Vernet et al., 2001).

### *EBA 2 (19th–18th century BC)*

In this settlement phase, *O. europaea* is likewise abundantly attested (38%), followed by evergreen taxa, namely, *Q. ilex* (12%), *Arbutus unedo* (9%), *R. alaternus* (6%) and *Erica* (4%). *Ficus carica* was found in very small quantities (1%).

### *RBA (13th to early 12th centuries BC)*

In the RBA, the number of identified taxa increases to 10. In this phase, *Q. ilex* becomes the main taxon (38%), while *O. europaea* strongly declines (7%). The Mediterranean evergreen vegetation is also represented by *Erica* (8%), *A. unedo* (7%), *R. alaternus* (5%) and *Cistus* (3%). *Quercus pubescens* (1%) and *Quercus suber* (5%) appear.

## Discussion

### *EBA (21st–18th century BC)*

During the EBA, our charcoal data show the stable presence of Mediterranean evergreen vegetation with olive (*O. europaea*), *Q.*

*ilex, R. alaternus, Cistus, A. unedo, Erica* and finally the fruit tree *F. carica* in both the periods investigated (EBA 1, 21st century BC; and EBA2, 19th–18th century BC). Of considerable interest is the high frequency of olive, ranging between 31% and 38%, respectively, in EBA1 and EBA2.

Following Spampinato et al. (2010), the potential vegetation of this Tyrrhenian coast district is represented by mixed forest with both deciduous and evergreen *Quercus*; in this vegetation type, the presence of wild olive is scarce being limited to coastal rocky slopes. In this respect, such a high presence of olive in the charcoal records seems to be quite incompatible with the ecological condition in this area. Quézel and Médail (2003) consider wild olive dominant element of thermophilous sclerophyllous scrublands characterised by the strong presence of also *Pistacia lentiscus* and *Ceratonia siliqua*; this vegetation type develops in arid bioclimate (thermomediterranean étage).

Palaeoclimatic studies show that from the middle-Holocene onward (~2500 BC), drier conditions developed in the south-central Mediterranean under latitudes below 40°N (Magny et al., 2013). This climatic phase might justify the expansion of thermo-xerophilous vegetation. However, the anthracological assemblage somewhat conflicts with this hypothesis because of the presence of *R. alaternus* and *A. unedo*, which testify to a relatively humid climate. Moreover, the relative high frequencies (11%) of light-demanding and fire-adapted *Cistus* (Thanos et al., 1992) in the EBA1 contexts could indicate open spaces generated by anthropogenic disturbance through fire and clearing activities.

To sum up, we hypothesise that the large amount of olive charcoal can be explained by cultivation, not necessarily implying domestication, carried out by local communities probably with agronomic practices devoted to favouring the spread of the trees already growing in the wild vegetation community. The high amount of olive wood at Punta di Zambrone certainly implies wide availability in the surroundings and easy accessibility, which could be explained with the use of pruned branches for firewood. The existence of pruning practices to stimulate the production of better fruits would be a further supportive evidence for cultivation (Asouti, 2003).

In the central-western Mediterranean, the cultural history of the olive seems to start in the Neolithic: archaeobotanical data from the southern Iberian peninsula (Rodríguez-Ariza and Montes Moya, 2005) and from southern Italy (Grotta dell'Uzzo, northern Sicily: Costantini, 1981) show that gathering of wild olive fruits was a common practice among human populations at that time.

The central Mediterranean is considered by some authors an area of secondary domestication process, with hybridisation between locally exploited wild forms and introduced cultivars since the Iron Age (first millennium BC), thanks to the Phoenicians and Greeks (Terral et al., 2004; Zohary and Hopf, 2000). By contrast, other studies support the idea of a multiple origin of the cultivars throughout the Mediterranean basin probably related to multiple independent primary events of domestication (Baldoni et al., 2006; Belaj et al., 2012; Besnard et al., 2001, 2007; Cazzella and Recchia, 2009; Breton et al., 2009). In this respect, the data from Punta di Zambrone could testify to an early domestication event well constrained to the EBA, consistent with this last hypothesis.

It is noteworthy that, in this period, also fig (*F. carica*) is found in the charcoal assemblage of Punta di Zambrone. Fig is reported to be one of the first domesticated trees of the Old World just like olive (Zohary and Hopf, 2000), probably because both these trees lent themselves easily to vegetative propagation, being possible simply through cuttings (Zohary and Hopf, 2000). The contemporary presence of two early domesticated trees such as olive and fig could be further evidence that these people were aware of the horticultural expertise needed to grow them.

During EBA2, the Poro (Tropea) peninsula experienced an increase in the number of settlements. Noteworthy in this period is a diffusion of sites not only on the Poro highplain (Pacciarelli, 2000, 2008, 2010).

At Bagnara Calabra, ~70 km south of Tropea (Figure 3), a strong presence of olive charcoal, mixed with *Fraxinus ornus, A. unedo* and *Rhamnus-Phillyrea*, has been documented in the coastal cave 'Grotta di San Sebastiano' frequented from late Chalcolithic times onwards (Martinelli et al., 2004). The vegetation inferred from the charcoal assemblage closely resembles that of Punta di Zambrone and seems incompatible with a widespread presence of wild olive; again, it seems more conceivable that cultivation practices were carried out at the site by the local population. Thus, charcoal data suggest that olive was cultivated in an extensive area of the southern Tyrrhenian coast.

A comparison with the scant archaeobotanical data from other settlements in southern Italy allow the relationship between human communities and the olive tree during the Bronze Age to be better understood. Interestingly, already at the beginning of the MBA (17th–15th centuries BC) in the settlement at Tufariello near Buccino (Campanian Apennine), located inland at ~ 400 m a.s.l. 300 km north of Punta di Zambrone (Figure 3), ~100 olive pits were recorded (Holloway, 1975). The location of the site outside the natural range of the wild olive testifies to the consumption and transport of olive fruits or perhaps by means of product exchange during the early MBA.

On the Adriatic coast of Italy (Figure 3), evidence for olive cultivation was found at the fortified settlement of Coppa Nevigata (Fiorentino and D'Oronzo, 2012) in the mid-MBA (15th century BC). Here, charcoal analyses revealed the presence of a mixed deciduous forest, but notably olive charcoal reached percentages higher than 40% (Fiorentino and D'Oronzo, 2012). Moreover, organic residue analysis revealed the presence of oil among the contents of a pot from Coppa Nevigata dating to the 18th century BC (Evans and Recchia, 2005). Cazzella and Recchia (2009) collected also other evidence pointing at olive cultivation in southern Italy during the EBA and the early MBA.

To sum up, the data suggest that during the EBA and the early MBA, in a large portion of southern Italy, olive cultivation could have developed independently of the influence of contacts with Mycenaean Greece, although Italo-Aegean contacts and know-how transfer of the *olive culture* at the end of the Copper Age cannot be fully excluded. Such earlier contacts were part of the so-called Cetina exchange network functioning between Sicily, southern Italy, the eastern Adriatic and the Aegean as far as Troy (Jung and Weninger, 2015; Maran, 1998; Pacciarelli et al., 2015). In the Eastern Mediterranean, the EBA (end 4th–3rd millennium) has also been considered the starting date of olive cultivation (for a review, see Margaritis, 2013). *Olea* cultivation can be traced back to the end of the EBA at Santorini (Asouti, 2003); in this island, olive charcoal probably coming from pruned branches reach 90% of the charcoal assemblage (Bottema-Mac Gillavry, 2003/2004), while the first evidence to date for oil extraction, and thus cultivation on a larger scale, is dated to *c*. 2100–2000 BC in Crete, at Chamalevri (Sarpaki, 1999).

### *RBA (13th to early 12th century BC)*

Charcoal data from the RBA (13th to early 12th centuries BC) context represent the vegetation landscape at Punta di Zambrone *c*. 400 years later. Archaeological data showed that at the end of MBA (14th century BC), many settlements of Poro highplain were abandoned. The same taxa of the previous phase are recorded, but notably a strong rise in *Q. ilex* is recorded and broadleaf oaks (*Q. pubescens*) and cork oak (*Q. suber*) appear in the landscape; by contrast, olive falls sharply (7%). These data seem to indicate the expansion of a more or less dense forest

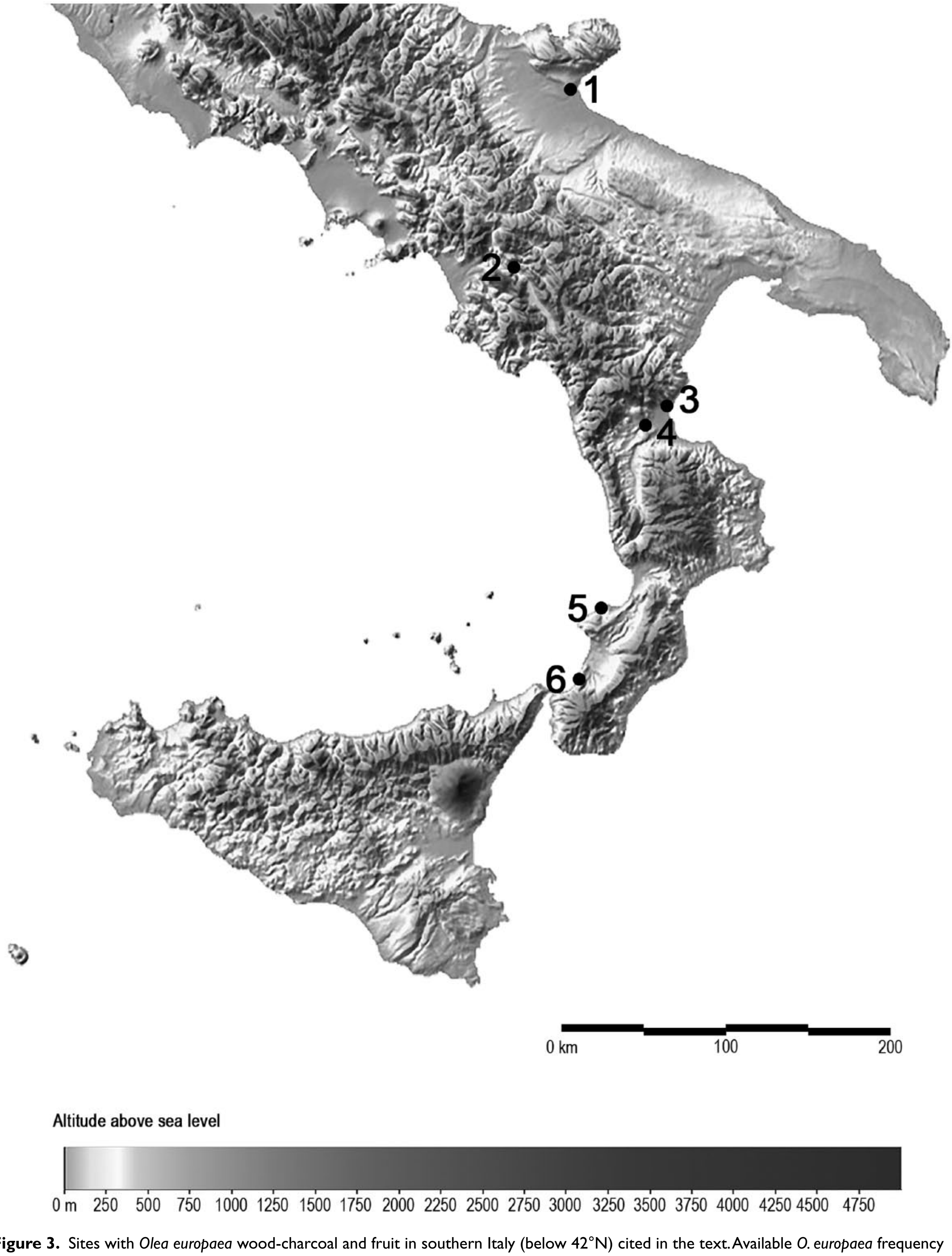


**Figure 3.** Sites with *Olea europaea* wood-charcoal and fruit in southern Italy (below 42°N) cited in the text. Available *O. europaea* frequency data are reported in the text. For key of the site identities, geographical coordinates and references, see Table 2.

dominated by evergreen and deciduous oaks. Thus, charcoal data probably document the reforestation of old cultivated fields abandoned in correspondence to the depopulation of the Poro peninsula during the end of the MBA.

The transition from the MBA to the RBA in the southern Tyrrhenian area is a time of profound change, characterised by the changing of economic systems, related to the diffusion of the so-called *Subapennine culture*. In southern Calabria, on the Aeolian islands and in north-western Sicily, this new culture spread with a sudden 'wave' of change, at least in part related to the arrival of new human groups (see Pacciarelli in Jung et al., 2015). These communities spread from more northerly areas of the Italian peninsula, probably bringing with them their different land-use practices.

**Table 2.** Geographical data and references of the archaeological sites below 42°N recording *Olea europaea* wood-charcoals and fruits showed in Figure 3.

| # | Site | Elevation (m a.s.l.) | Geographical coordinates | | Bioclimatic level (Blasi et al., 2010) | References |
|---|---|---|---|---|---|---|
| | | | Latitude (°N) | Longitude (°E) | | |
| 1 | Manfredonia – Coppa Nevigata | 2 | 41,557,531 | 15,829,436 | Mesomed. | Fiorentino and D'Oronzo (2012) |
| 2 | Buccino – Tufariello | 423 | 40,597,974 | 15,410,491 | Mesomed. | Holloway (1975) |
| 3 | Trebisacce – Broglio | 164 | 39,864,086 | 16,504,474 | Mesomed./Thermomed. | Celant (2002), Nisbet and Ventura (1994) |
| 4 | Spezzano Albanese – Torre Mordillo | 96 | 39,715,167 | 16,315,476 | Thermomed. | Coubray (2001) |
| 5 | Punta di Zambrone | 19 | 38,714,103 | 15,972,835 | Mesomed./Thermomed. | This paper |
| 6 | Bagnara Calabra-San Sebastiano | 48 | 38,317,019 | 15,826,804 | Mesomed./Thermomed. | Martinelli et al. (2004) |

Our data suggest a reduced interest for olive and a more wooded landscape at least at the beginning of the RBA, imputable to the reduced land use in MBA 3, and consistent with local bioclimatic conditions.

In this period, it is worth noting the considerable presence of fungal hyphae found in the charcoal fragments (35% in the RBA layers vs 0.35% in the EBA layers). This evidence could attest the practice of gathering dead wood with low calorific value and poor technological properties, as compared with seasoned undecayed wood. This is probably due to a more opportunistic way for a fast and easy collection of the wood to be used in daily domestic activities.

As regards olive, it seems that the populations of RBA had little or no interest in it.

A probable explanation could be their different cultural and economic background. From this perspective, it is also worth noting the appearance in the RBA of broomcorn millet (*Panicum miliaceum* L.) absent in the previous phases (Jung et al., 2015). Between the 15th and 13th centuries BC, broomcorn millets were recorded for the first time also in Apulia on the Adriatic coast (Primavera et al., in press); this could further support the hypothesis that the *Subapennine culture* brought in south-western Italy a different agronomic knowledge. Broomcorn millet seems to have arrived in the Mediterranean basin from northern Europe (Van Zeist, 1980), becoming a staple crop in the Bronze Age (Hopf, 1991).

At Bagnara Calabra, in the San Sebastiano cave (Figure 3), charcoal analysis documented for the MBA 3 (14th century BC) the same change in vegetation cover: an increase in evergreen *Quercus* and a sharp decline in *O. europaea* (Martinelli et al., 2004). It is worth noting that forest expansion with a contemporary disappearance of olive is recorded also far from our study area, along the southern Adriatic coast at the site of Coppa Nevigata (Fiorentino and D'Oronzo, 2012) on the Gargano Promontory (Figure 3). A forest expansion is also recorded at Trifoglietti Lake (Calabria, 1048 m a.s.l.; Joannin et al., 2012) where both silver fir and deciduous oak recover after the decline during the EBA.

Thus, from the beginning of the RBA, charcoal data clearly show a vegetation cover change involving south-western Italy and closely related to the spread in this region of a different culture and/or economic system; this change appears to have halted this first event of olive cultivation.

Indeed, a major change in land use, albeit without implication in olive cultivation, is also documented in the Lago di Mezzano (central Italy, 452 m a.s.l.; Sadori et al., 2004). Here, the pollen sequence records a first phase of more intense agricultural activities in the EBA/MBA and a subsequent period of abandonment followed by a less intense land exploitation phase in the RBA when the forest expanded between the 13th and 12th centuries BC. During the RBA, the expansion of mixed oak woods, after a period of marked deforestation in the EBA and MBA has been documented by several other pollen sequences along the central Italian peninsula (Lake Albano and Lake Nemi in Lazio; Mercuri et al., 2002) and in the central Adriatic marine core (Mercuri et al., 2012), documenting at the same time the reduction in human impact.

As regards the olive, it must be noted that the Ionian coast of Calabria experienced a different landscape history. Here, at Broglio di Trebisacce in the plain of Sibari at 164 m a.s.l. (Moffa, 2002; Figure 3), *Olea* is constantly found between the MBA and RBA, as documented both by abundant charcoal and by imprints of leaves (Celant, 2002; Nisbet and Ventura, 1994) and chemical residues of oil in a large ceramic container dated to the Final Bronze Age (Celant, 2002; Peroni, 1994). Furthermore, during the RBA, olive started to be moderately attested also on the nearby plateau site of Torre Mordillo at 200 m a.s.l. (Coubray, 2001; Figure 3). Here, the vegetation cover with deciduous tree taxa suggests that olive was probably introduced at that time.

## Conclusion

Archaeological charcoal data constitute a valuable proxy for reconstructing the history of vegetation, above all in relation to human activities, both in their very detailed space-time definition and because they allow greater integration with local human history. Such data are able to reveal vegetation changes occurring at a local scale between the EBA and the RBA, above all shedding light on the puzzling history of the olive tree. In our study area, we hypothesised an episode of olive cultivation, not necessarily implying domestication, at the beginning of EBA, conflicting with the theory that considers it only as a result of later contact with Mycenaean Greece. Data from Punta di Zambrone coupled with other archaeobotanical literature suggest that a large scattered sector of southern Italy experienced this first cultivation episode at the same time.

Olive cultivation was interrupted during the RBA, probably because of the spread in south-western Italy of different cultural and economic systems. RBA forest cover was because of the partial abandonment of cultivated fields at the end of MBA and also the change in land use that characterised the RBA communities. This different human impact is also recorded in a large portion of central and southern Italy. On the whole, it seems plausible that olive cultivation and the subsequent increase in forest cover are clearly independent of climatic factors.

To sum up, the data from Punta di Zambrone do not have an exclusively local significance: they allow a neglected chapter of the history of olive cultivation in a broad sector of southern Italy to be highlighted. In this respect, further studies are needed to fill the gaps of knowledge still present, both in terms of the geographical extent of this episode and its cultural identity.

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