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Into the woods

Overlapping perspectives on the history of ancient forest

Sandrine Paradis-Grenouillet,
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Overlapping perspectives on the history of ancient forests

SANDRINE PARADIS-GRENOUILLET, CHANTAL ASPE AND SYLVAIN BURRI (EDS.)

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Part 3: “At the edge of the forest”: other ways to think about ancient and old-growth forests

Chapter 11: The ‘recent’ forests of Mount Venda (Padua, Italy): when historical cartography and archaeobotany tell quite a different story

Sandrine Paradis-Grenouillet and Giuseppe Bazan

The Euganean Hills, the green lungs of the Padua plains, are known today for their landscape diversity, combining vine terraces, olive groves and forests. Although forested areas represent just over 32% of the area of the Colli Euganei Regional Park, very few studies have been carried out to date (Del Favero, 2001; Sitzia *et al.*, 2010). Considered recent by local stakeholders, these forests are usually described as being the result of spontaneous reforestation linked to various phases of rural decline that have taken place over the last century. Away from the tourist trails, however, the structure and composition of these forests suggest a much older history. The work carried out as part of the research programmes THISTLE[69] (MSCA Fellowship – Paradis-Grenouillet, grant agreement: 656397) and MEMOLA[70] (EU FP7 Project – Jose Maria Civentos, grant agreement: 613265), involving a multidisciplinary approach that combines historical mapping with spatial archaeology and archaeobotany, offers a new interpretation of the forest history in this area. These two research programmes, conducted in collaboration with Colli Euganei Regional Park staff, aim to trace the evolution and transformation of forest areas over time to better understand the landscapes and their current dynamics. Using Mount Venda, the highest hill of the massif, as an example, this work demonstrates a lack of understanding, or perhaps even denial, of local forest history and allows us to deconstruct the myth that the mountain was devoid of forests in the past.

Study area and historical context

The Euganean Hills stand out quite distinctly from the topographically flat plain that stretches between the Adige and the Bacchiglione, south-west of Padua. Of volcanic origin, they are a range of small hills such as Monte Venda (Figure 11-1) that are just over 600 meters above sea level. The Colli Euganei Regional Park, established in 1989, is responsible for the protection of this area, which includes, in whole or in part, 15 municipalities. Although the area has a continental climate, with cold, rainy winters and dry summers, the morphology of the hills offers shelter from cold winds and creates favourable microclimates, explaining the presence of Mediterranean vegetation, such as the fragmented Mediterranean maquis shrubland located on the warmer siliceous foothills. The Euganean Hills, which have always been recognized for their environmental features, are an island of high biodiversity within a lowland area subject to intense anthropogenic exploitation. The high level of biodiversity is related to Mediterranean and oriental influences and is increased by the type of substrate.

The great landscape heterogeneity of the Euganean Hills, combined with the diversity of topoclimatic contexts, is enhanced by the historical context. Landscape transformations brought about by anthropogenic activities are confirmed by palynological analyses dating back to at least the Neolithic period, with an increasingly pronounced influence from the Bronze Age to modern times (Kaltenrieder *et al.*, 2010; Bianchin Citton, 2011). The best-known history of this area is associated with the development of the thermal baths that are still in operation in Montegrotto or the extraction of trachyte, a building stone used to pave numerous cities in the Padua region (Billanovich, 1997; Fasulo *et al.*, 1997; Grandis *et al.*, 1997; Bortolami, 2003). In this local history, forests are very rarely mentioned (Lorenzoni *et al.*, 1989; Grandis, 2011) although they seem to have played a significant role in the development of the Po Valley. Drainage work to extend agricultural land, known as reclamation, started in the 12th to 13th centuries by the Republic of Venice and led to the gradual eradication of wooded areas. From then on, reliefs such as the ‘Colli Euganei’, the ‘Colli Berici’ and indeed the ‘Trento’ became veritable reservoirs of ligneous material that was used both for timber and for fuel. Although the floating of timber originating from Trento, particularly on the river Brenta, is well understood and relatively well documented since it is the main means of wood supply for the city of Venice (Braunstein, 1988; Casti and Zolli, 1988; Agnoletti, 1998), no work has been carried out on other potential wood supply basins. The research

conducted under the THISTLE programme provides new insights into the role played by the Euganean Hills in the wood supply strategies of the Padua region. This approach to forest archaeology provides valuable data for local forest managers who are striving to meet the objectives set by national and European institutions for the protection and appreciation of ancient forests.

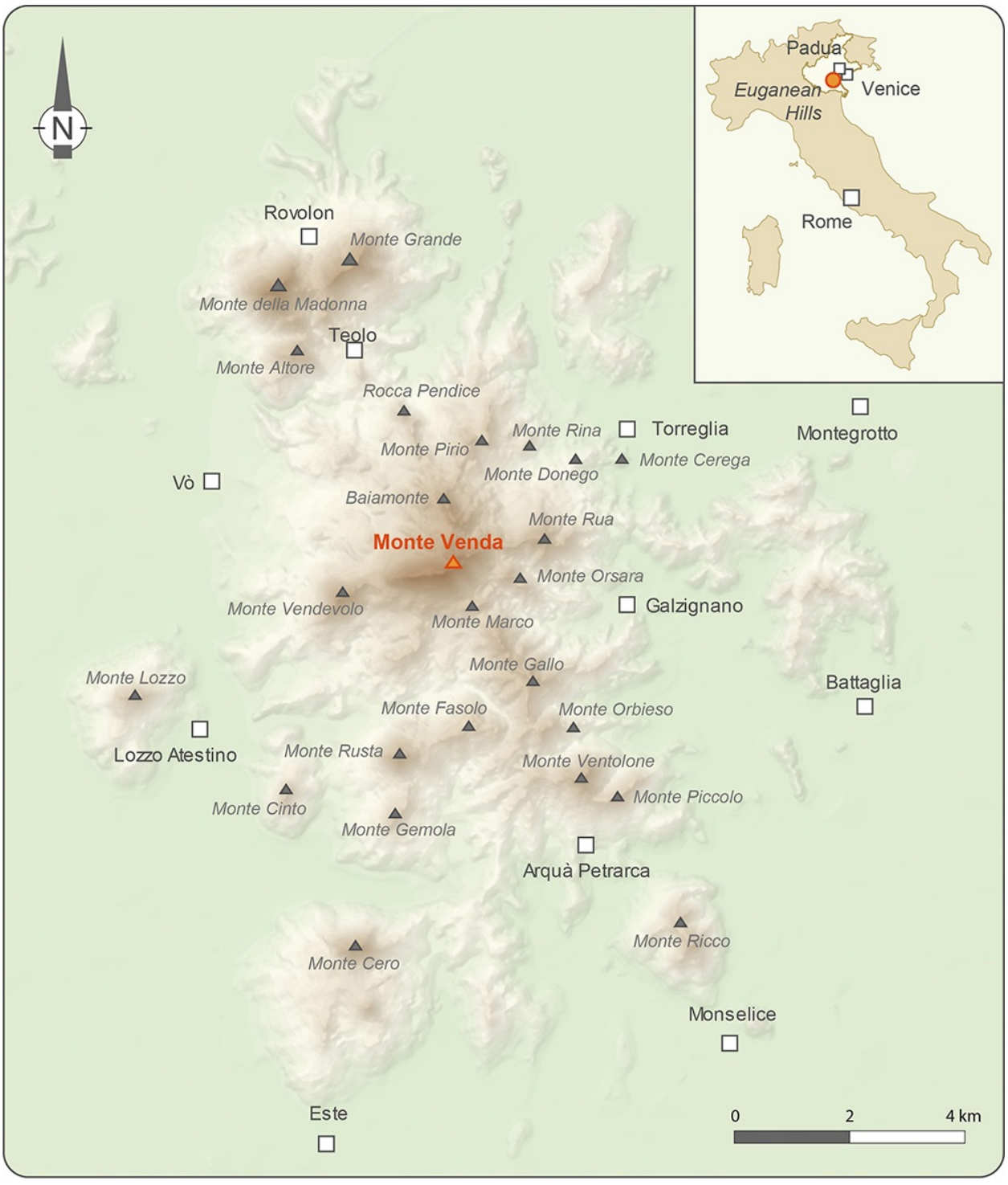

Figure 11-1: Map showing the locations of the Euganean Hills and Monte Venda.

Materials and methods

This work is based on a retrogressive approach, starting from the composition and structure of current forests and going back in time from various documentary collections: ancient maps, written documents, and archaeological and archaeobotanical remains. The research is focused on seven municipalities in the northern half of the Euganean Hills: Rovolon, Teolo, Cinto Euganeo, Vo, Torreglia, Galzignano Terme and Battaglia Terme, with particular attention on Monte Venda, which is located on the boundaries of four of these villages.

Cartographic approach

The current forest inventory was initially compiled from regional databases (Regione Veneto, 2016) then refined in some areas during field surveys carried out in collaboration with botanists and ecologists from the University of Padua and with local associations.

Thanks to historical mapping and especially analysis of the old cadastral maps established under the Austrian regime in the 1840s, it has been possible to reconstruct the expansion of forest areas in five of the seven municipalities. Unfortunately, the villages of Galzignano Terme and Battaglia Terme could not be fully documented due to the loss of records during a fire, when only the plans were saved. This historical mapping work required the georeferencing of nearly a hundred old maps, vectorization of more than 20,000 parcels and recording the land use and the owner’s name for each of them. All of the data recorded was integrated into a geographic information system to complete this comparative approach.

Archaeological approach in the forest

While cartographic documents allow spatial reconstruction of ancient forest areas and sometimes provide information on silvicultural management methods, it is particularly difficult to ascertain the botanical composition of the forests. Pedestrian surveys, supplemented by analysis of digital models of the terrain

acquired using the LIDAR technique, were carried out on various hills, thus revealing traces associated with the presence or absence of forests in the past.

Charcoal platforms are excellent indicators of past forest presence. The conversion of wood into charcoal to produce a more easily transportable fuel with a greater calorific value was generally carried out in the heart of the forest, which is why these platforms enable us, by their location alone, to map the extent of previously forested areas. In addition, radiocarbon dating of charcoal residues shows the period of activity, while anthracological and dendro-anthracological analyses provide a relatively accurate reproduction of the physionomy of the forest areas exploited (Bonhôte, 1987; Ludemann *et al.*, 2004; Pelachs *et al.*, 2009; Rouaud, 2013; Paradis-Grenouillet *et al.*, 2015).

In contrast to the evidence provided by charcoal platforms, the remnants of low stone walls associated with agricultural terraces or indeed dwellings, along with stone and clay quarries, bear witness to the openness of the environment in the past.

All of the archaeological remains have been mapped within the same geographical information system as that used for the historical cartography to compare these data with known land uses, both in the present day and in the 19th century.

To date, surveys have been carried out on the ‘della Madonna’, ‘Grande’, ‘Cinto’ and ‘Venda’ mountains. But a systematic survey has only been done on Mount Venda. This is why comparative analysis of all of the acquired sources has been carried out only on this massif.

Anthracology of the charcoal platforms

To date, over 40 charcoal platforms have been identified on the mountains surveyed and 13 of these have been sampled. Sampling was carried out according to protocols established by previous work on charcoal making, i.e., at 5 cm intervals in 25 cm by 25 cm pits (Davasse, 2000; Fabre and Auffray, 2002; Paradis-Grenouillet, 2012). Separation of the charcoal was then performed using the flotation system at the archaeology department at Ponte di Brenta (University of Padua). A total of 130 samples were taken.

The taxonomic determination and dendro-anthracological measurements of 12

samples were carried out in the GEOLAB – UMR 6042 CNRS (University de Limoges) research laboratory using a Nikon SMZ800 binocular magnifying glass and a Nikon Eclipse LV100 episcopic microscope. Taxonomic determination entails observation of three cross-sections of each piece of charcoal to identify the anatomical criteria specific to each taxon (Schweingruber *et al.*, 2011; Crivellaro *et al.*, 2013).

As regards dendro-anthracological analyses, these are carried out by recording the measurements of each charcoal, counting the number of visible rings and measuring the curve radius (the distance from the last visible ring in relation to the heart of the wood) using the AnthracoLoJ software (Paradis-Grenouillet *et al.*, 2010). This data provides an overall picture of the diameter of the wood used for making the charcoal and allows for an analysis of the growing conditions of the trees used in the past (Dufraisse and Garcia-Martinez, 2011; Paradis-Grenouillet, 2012). The results obtained are compared with the botanical surveys carried out on each of the platforms, thus enabling the identification of any possible changes in the forests in the Euganean Hills.

The analysis initially focused on depth levels, allowing the selection of the most suitable charcoal fragments for radiocarbon dating (pieces with bark still visible or those furthest from the heart of the wood). Ten dating operations were carried out on 5 grams of charcoal of the same taxon using the liquid scintillation method at the Radiocarbon Dating Centre at the University of Lyon.

In the context of this chapter, only the anthracological results from the charcoal platforms found on Monte Venda will be presented.

Results and discussion

Almost equivalent afforestation rates from 1840 to the present day

Comparison of data from the current vegetation map with that acquired from the vectorization of the Austrian cadastral maps shows only a slight change in afforestation rates over the last 180 years (Figure 11-2). Although the description of the afforestation is not consistent for the two periods studied, knowledge of

the area allows us to associate ‘chestnut woodlands’, made up of ageing coppices, with the mixed thickets shown on the Austrian cadastral maps. While it is impossible to be certain that these were chestnut coppices from the cartographic documents alone, an initial comparison allows us to put forward the hypothesis of a continuous presence of coppices on the slopes of these volcanic hills.

The comparison between current vegetation and that of 1840 also brings to light the development of new forest formations: monospecific *Robinia pseudoacacia* forests. This invasive alien species was first imported into Italy in 1602, to be grown in the botanic gardens in Padua, and was reported in the Euganean Hills along the edge of cultivated field by Béguinot (1904). It was gradually introduced into the gardens of the grand villas of the Euganean Hills from where it spread, colonized, and indeed continues to invade agricultural land and abandoned pastures.

This initial comparison thus highlights the presence of two types of afforestation: recent forests composed of *Robinia pseudoacacia* at the foot of the slopes, and on the slopes themselves, probably ancient forests, made up of chestnut thickets. The focus on Mount Venda within this paper supports these hypotheses.

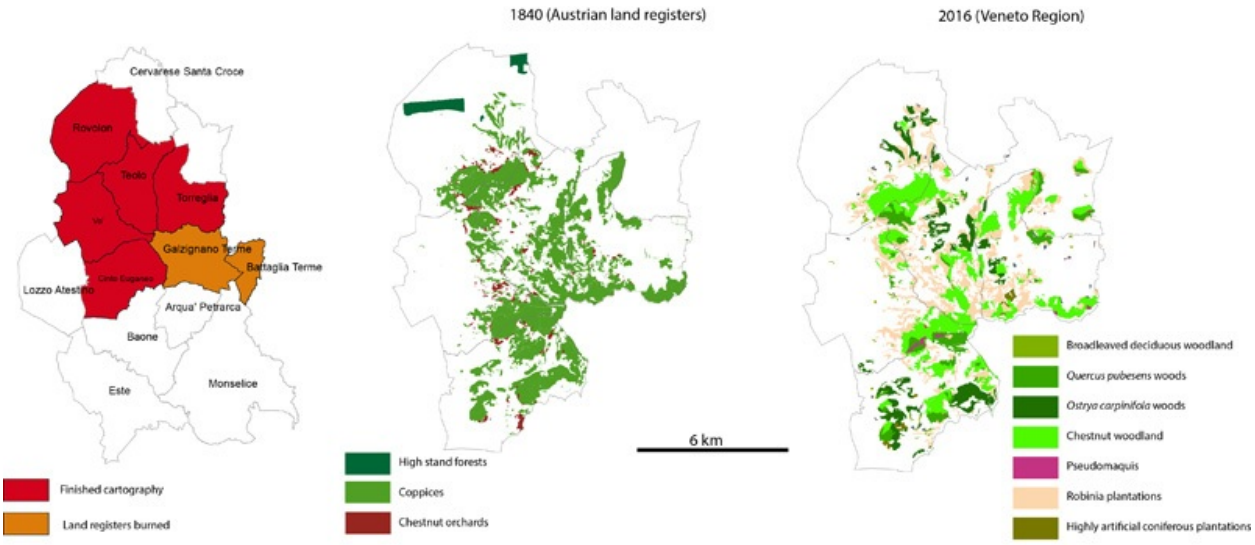

Figure 11-2: Comparison of the forest areas of the 19th century and today in the communes of Rovolon, Teolo, Torreglia, Cinto Euganeo and Vo.

Monte Venda, a case study conducive to a multidisciplinary approach

Identification of the ancient forests of Monte Venda using cartographic data

Mount Venda's forests are dominated by chestnut coppices (*Castanea sativa* woodland) and by downy oak coppices (*Quercus pubescens* woods) covering 52% and 35% of the study area, respectively, while the lower slopes are covered almost entirely by False acacia formation (*Robinia* plantations), accounting for 10% of the area. Lastly, it is worth noting the presence of *Pseudomaquis* on the southern side of the mountain, which accounts for a little over 3% of the total afforestation (Region, 2016; Figure 11-3).

In 1840, the mountain was mostly covered by mixed coppices. This alone accounted for 73% of the area covered by the Austrian cadastral maps studied (land use and names of owners in the commune of Galzignano not having been included because the records had since been destroyed).

Comparing the Austrian cadastral maps with maps of current vegetation shows very little change in the locations of forested areas. The area around the Monastery 'degli Olivetani', located near the summit of Monte Venda, has closed in, as have some lower parts of the slopes which were once cultivated after having been terraced. This closing in of the vegetation, especially at the foot of slopes, is the result of colonization by monospecific *Robinia* forests.

In the absence of any study of maps dating from the intermediate periods, it is difficult to prove continuity of these wooded areas during the 19th and 20th centuries. Nevertheless, the presence of particularly large stumps, sometimes up to 6 m in diameter, on numerous parcels of land suggests a pattern that has continued for several centuries. The works of Ries (1988) and Aymard and Fredon (1986) indicate that "for 20-year rotations, the stumps would have a diameter of about 1 m by the end of a century".

Additionally, the biodiversity within these forest areas reinforces the hypothesis of woodland having been present on these same plots for several centuries.

Going back a little further in time, thanks to a religious document '*il catastico di San Giovanni del Venda*' it is possible, albeit in a somewhat ad hoc manner, to attest to the presence of forests on some plots in 1750. Given the description "wood intended to provide firewood for the house", these forests were probably managed as coppices (Figure 11-3).

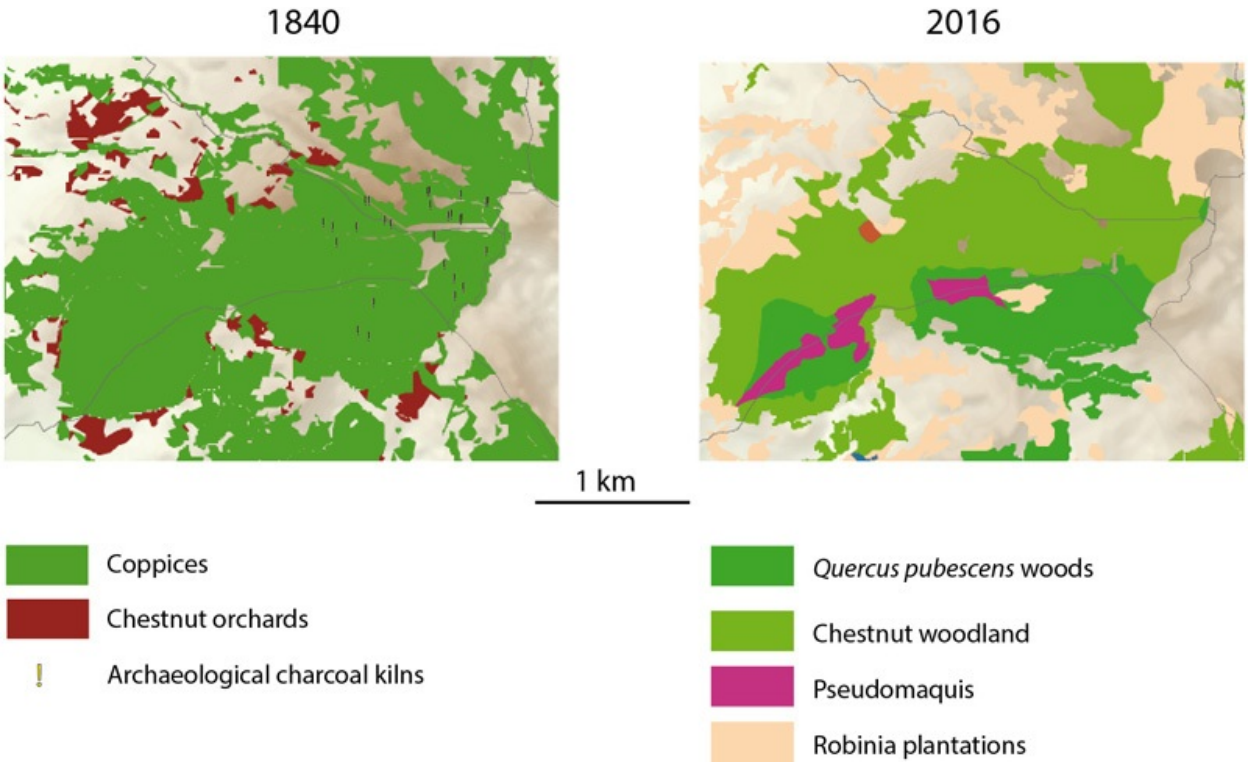

Figure 11-3: Map of Monte Venda, showing forest areas on cadastral maps and in the present day and localization of archaeological charcoal kilns.

Anthracology of charcoal platforms attests to forest continuity on some plots since the 14th century

The presence of charcoal platforms also reinforces the hypothesis of forest continuity on these plots. These archaeological remains are especially vulnerable not only to forestry activities but also to erosion, which is greatly accentuated in areas of the Euganean Hills where the landscape is open. The discovery on the slopes of Monte Venda of about thirty particularly well-preserved charcoal platforms adds much to the debate on the age of the forests.

Furthermore, radiocarbon dating carried out on deeper layers of seven of the platforms reveals that the practice is much older than is generally suggested by tourist information about the national park. Often associated with the 19th century, charcoal making appears to have begun much earlier. For example, the deeper levels of charcoal platforms Venda 199 and 207 date to the end of the 13th century (Figure 11-4). As for the other dates, they are between the 14th and 18th centuries. It is particularly interesting to note the absence of very recent platforms. In fact, the vast majority of studies on charcoal making reveal a large number of 18th- and 19th-century platforms and a smaller number of older

platforms (Davasse, 2000; Euba, 2008; Oillic, 2011; Rouaud, 2013).

In addition to the spatial and chronological information provided by the archaeological study of charcoal platforms, anthracological and dendro-anthracological analyses enable the reconstruction of local forest populations over the last six centuries. To date, over 1,000 charcoal pieces taken from the deeper layers have been analysed. The taxonomic results reveal a very small change in forest composition between archaeological remains and current vegetation. The anthracological spectra obtained show a clear distinction between vegetation on the northern and southern slopes. Within the platforms on the southern slopes we find taxa associated with Pseudomaquis with a significant occurrence of numerous fragments identified as *Erica arborea*.

As regards the northern slopes, there is also a botanical diversity similar to that visible today, with some areas dominated by chestnut and others dominated by beech and oak. All that can be observed is a change in the proportions of the taxa. This is the case for charcoal platforms Venda 198 and 199, which show a predominance of beech charcoal in the deeper layers, whereas today, although present in the environment, this taxon represents less than 3% to 5% of the tree vegetation in a 300 m radius around the platform.

It is interesting to note that analysis of anthracological assemblages has revealed very little taxonomic diversity for the charcoal platforms overall, generally with one or two dominant taxa (oak, chestnut or beech) and fewer than ten additional secondary taxa, which are also secondary in current tree populations. These are ash, maple, hornbeam, hazelnut, poplar, spindle, viburnum, elm and dogwood.

This absence of any radical change in the tree taxa over the last six centuries reinforces the idea of a continued presence of forests on the slopes of Monte Venda and of ancient forests in the surrounding area.

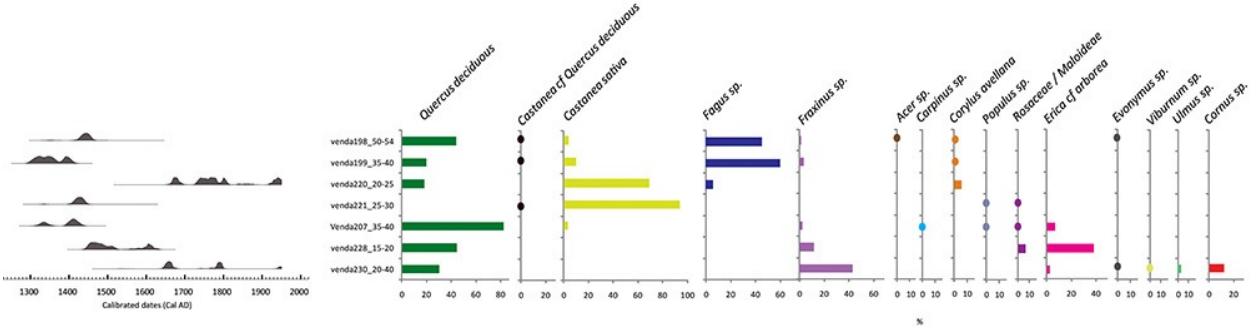

Figure 11-4: Radiocarbon dating and anthracological results.

The use of dendro-anthracology to better understand silvicultural practices

To complete this analysis and better understand the past silvicultural practices that led to the creation of the current landscapes, wood diameter studies were carried out and proved to be especially interesting. Curve radius measurements were made on more than 800 pieces of charcoal, but given the methodological requirements for wood diameter studies, measurements were taken only on the dominant taxa. This enabled the acquisition of more than 50 curve radius measurements, which were used to reconstruct the diameters of the wood originally used to make the charcoal. This represents a collection of 487 usable pieces of charcoal. The results obtained show that most of the wood used was less than 5 cm in diameter, and even 2 cm for some charcoal platforms (Figure 11-5). Results from only three platforms (Venda 198, 199 and 221) indicate the use of wood with a diameter of over 18 cm. These three platforms, located on the northern slopes and in areas with relatively thick soil, are also the oldest dated so far (13th to 15th centuries). This raises the question of whether the presence of larger diameter wood is dependent on the location of the platforms or on the chronological period, which could correspond with a period of lower pressure on forest resources. The last platform analysed to date on this same slope, dating back to a more recent period (Venda 220, dating from the 17th to 20th centuries) presents smaller wood diameters, which may indicate an increase in pressure on forest resources over time. However, based on these results alone, it remains impossible to confirm this type of hypothesis and it is therefore essential not only to continue such analyses on a greater number of platforms on the northern slopes, but also to study the layers of older platforms in order to evaluate a possible change in wood species exploited over the course of time.

With regard to the southern slope, regardless of the chronological period, the wood used for making charcoal was always less than 5 centimetres in diameter. While the topo-climatic conditions are indeed less conducive to the rapid growth of tree species, such diameters suggest a specific practice corresponding either to the use of only branch wood, with the trunks being used for other purposes, or to the exploitation of coppice with very short rotation cycles. In terms of historical data, the second hypothesis seems to be the most likely, since most of the forest areas shown on the 1840 cadastral maps are labelled as coppices. To produce wood with a diameter of less than 5 cm, the coppices were probably harvested between the sapling stage and the juvenile stage, i.e., before the wood reached a diameter of 10 cm at a height of 1.3 m from the ground. These observations

could partly explain the apparent amnesia amongst the locals with regard to forest history. Such coppices were perhaps not considered to be forests, especially since regular cutting must have made the landscape appear quite open.

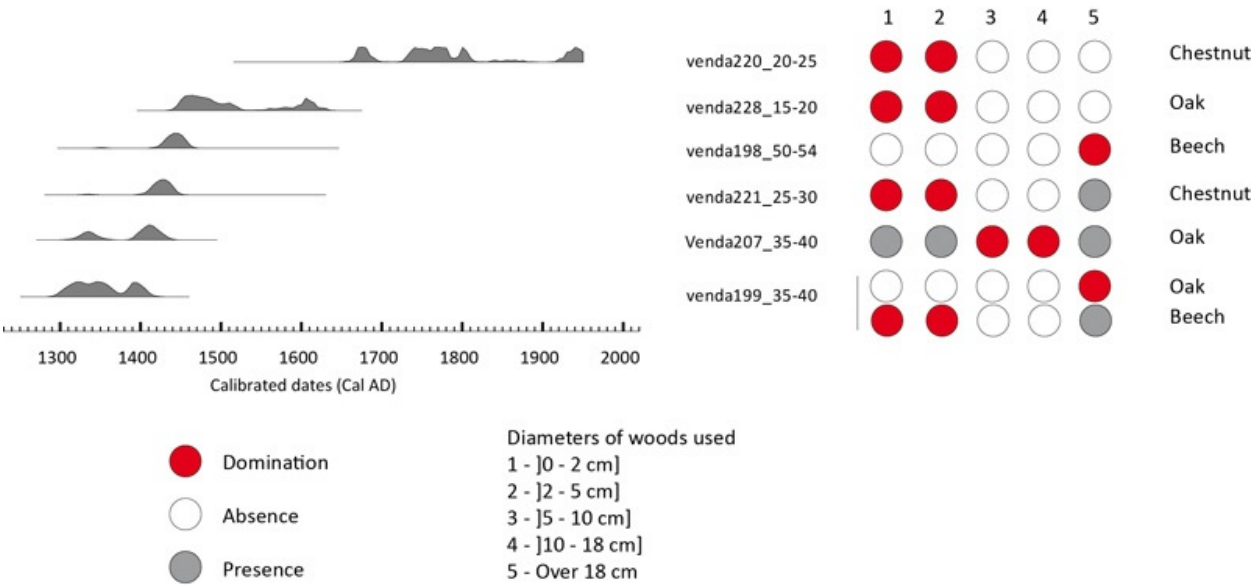

Figure 11-5: Dendro-anthracological results.

Conclusion

The combination of historical mapping, spatial archaeology and archaeobotanical approaches now offers new insights into the forest history of the Euganean Hills and more specifically the history of Monte Venda. While the forests in this area are generally regarded as recent and without any particular economic potential, our approach has revealed not only a long forest history but also the presence of many ancient forests. These old-growth thickets bear witness to the important economic role played by the forests of the Euganean Hills over the centuries. If they are sick and endangered today, it is not due to climate change or a new disease, but to a change in human practices. Maintaining this type of coppice requires regular cutting (every 10 to 20 years) which no longer takes place today, so some coppices are as much as 40 years old.

These cultural landscapes, passed down through at least five or six centuries of forest exploitation, are today in a state of constant transformation, no longer needing to meet society’s demands. When it has had the authority and funding,

the Colli Euganei Regional Park has gradually transformed these coppices into oak woods (notably through the LIFE Programme), Pannonian woods with *Quercus pubescens*, and 9260-*Castanea sativa* woods. However, factors included in this study could also encourage park authorities to safeguard some of these cultural forest landscapes by reintroducing shorter cutting intervals of oak and chestnut coppices. In these days of energy transition and with the return of green energies, the forests of Euganean Hills could even resume their productive function.

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