

Chapter 2

The Traditional Mediterranean Polycultural Landscape as Cultural Heritage: Its Origin and Historical Importance, Its Agro-Silvo-Pastoral Complexity and the Necessity for Its Identification and Inventory

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Abstract Today, the Mediterranean is characterized by landscape patterns whose compositions result from countless, long and complex cultural and historical processes. However, the pressure on these landscapes and their rapid transformation into more modern forms call out for a better knowledge of the more complex forms of traditional land use and relative landscapes. In this context, an identification and clarification of the role of such mixed and complex forms of agro-forestry systems and landscapes, named “*giardino Mediterraneo*” (“Mediterranean garden”) is necessary. This term is often applied to and associated with numerous different agricultural and agro-forestry systems as well as to numerous different kinds of rural landscapes, due to the complex and intricate historical process that has led to their identification and cultural evolution over time. This study identifies the characteristics of the polycultural and polyspecific Mediterranean garden’s landscape, characterized by the presence of trees (both wild and cultivated), starting from a historical overview of Sicily. The analysed *Halaesa* landscape (Sicily) case study, as one of the first historical detailed description of a complex Mediterranean cultural landscape, is the result of a polycultural agro-silvo-pastoral system which guarantees complexity and richness (in terms of structural and biological diversity), as well as with reference to others environmental, cultural and economic multifunctionality. However, a comparison with the typological systems currently used for the cataloguing and mapping of traditional Mediterranean landscapes at different

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scales shows the transversal importance of polycultural Mediterranean garden landscapes, and demonstrates how much a better definition and characterization of them is needed.

Keywords Biocultural diversity • Rural landscape • Landscape history • Landscape type • Landscape pattern • Landscape character • *Mediterranean garden* • *Coltura promiscua* • Material and non-material heritage • Multifunctionality • Mediterranean basin

2.1 Introduction

The different regions of the Mediterranean Basin show a high degree of both physical and climatic unity, despite the landscape's diversification by mountains, plateaus and plains, especially the coast. This environmental and ecological diversity (e.g. Braudel 1986) is also the consequence of the intersection of three different continents, and hence of their genetically different flora and fauna as well as their different civilizations (e.g. Braudel 1986; Grove and Rackham 2002; Mazzoleni et al. 2004; Blondel 2006). A complex "co-evolution" has shaped the interactions between natural ecosystems and the constantly evolving human land use practices (Di Castri et al. 1981), resulting in a mosaic of traditional rural landscapes which conserve many of the biological and cultural characteristics of those from the past. The first significant impact made by humans on forests and other natural ecosystems in the Mediterranean took place before the Neolithic revolution (Terral 2000), when permanent settlements were established. Forest management through wood cutting and coppicing, controlled burning, plant domestication, livestock husbandry, grazing and browsing, as well as through water management and terracing, has been the main tool for producing intermediate disturbance regimes for millennia (Zohary and Hopf 1993; Blondel 2006). These practices gradually led to complex and heterogeneous agro-silvo-pastoral rural patterns typified by a fine-grained mosaic pattern of land use (Sirami et al. 2010; Cullotta and Barbera 2011). This mosaic was made up of relatively small patches and corridors, and had a great species and interspecies diversity as a consequence of the cyclical disturbances introduced by rotational grazing, cutting and coppice regimes, fire management, as well as of cultivation and other human land use practices (Naveh 1995). Thus, these rural activities have played a major role in shaping the traditional Mediterranean landscape composition. The cultivation of arable land, olive groves, vineyards, mixed crops and fruit orchards and other multifunctional agricultural and agro-forestry systems are among the most important examples of traditional farming in the Mediterranean. Moreover, the conventional subdivision of properties into small units, due to the long intervals in ownership succession and property transfers, has further augmented this structural heterogeneity, thus influencing the contemporary cultural practices regarding rural landscapes (Horden and Purcell 2000). The physical expression of land division and

property ownership is visually reinforced by the presence of stone walls and other artefacts or features such as terraces, hedgerows, canals, stone heaps, etc. (Grove and Rackham 2002; Brown et al. 2007; Petanidou et al. 2008; Barbera and Cullotta 2012). Today, the entire Mediterranean is characterized by landscape patterns whose compositions result from countless long and complex cultural and historical processes that developed in an equally complex and varied environment. However, the pressure on these landscapes and their rapid transformation by the current practices of agricultural intensification, crop abandonment and urbanization (Farina 2000; MacDonald et al. 2000; Stoate et al. 2009) into more modern landscapes, calls out for a better definition of some of the more complex traditional ways of using land and its relative rural landscapes. Traditional agro-silvo-pastoral Mediterranean landscapes, particularly those characterized by the presence of trees (both as strictly agricultural cultivations as well as in wild woods or as isolated trees) have maintained some defining characteristics regarding their composition, structure and function during the course of their slow evolution (Bignal et al. 1995; Vos and Meekes 1999; Vicente and Alés 2006). Traditional landscapes refer to these landscapes with a long history, which evolved slowly and where it took centuries to form a characteristic structure reflecting harmonious integration of abiotic, biotic and cultural elements (Antrop 1997). Thus, they must be considered dynamic landscapes which main historical identity was left unchanged until the mid-twentieth century (Bignal et al. 1995; Vos and Meekes 1999; Antrop 2005). Trees on farmland have a long tradition in Europe as they offer multiple functions (Biasi et al. 2012; Nerlich et al. 2013). These features are particularly expressed in those landscapes that are characterized by complex agricultural forms, mixed agro-forestry systems and landscapes that are capable of generating and guaranteeing an articulated environmental as well as economic and social multifunctionality (Vos and Klijn 2000; Pinto-Correia and Vos 2004; Eichhorn et al. 2006; Jose 2009; Jones-Walters 2008; Sánchez et al. 2010; Pinto-Correia et al. 2011). Considering these mixed and complex forms of agro-forestry systems and landscapes, in which the tree holds a central role, a better definition and clarification of the role of the “*Mediterranean garden*” in the traditional rural landscape certainly seems necessary. This definition is so often generically associated with the countless different agricultural and agro-forestry systems and landscapes that have been produced by the complex and intricate historic processes that have led to their cultural definition and evolution. In this paper we use the term “Mediterranean garden” (*giardino Mediterraneo*) starting with the use and definition of it given by Emilio Sereni in its famous “*History of the Italian Agricultural Landscape*” (1961, trans. Litchfield 1997). This study traces the major historic, agricultural and rural processes that have characterized the Mediterranean basin in order to better define:

- the concept of a traditional rural Mediterranean landscape, with particular reference to that including fruit and non-fruit (wild) trees;
- the concept and importance of the polycultural systems and landscapes (*coltura promiscua*, *giardino Mediterraneo*), both because it is a historic landscape and because of its environmental complexity and value (multifunctionality);

- the transversal importance of the polycultural systems and landscape in the recent typological inventorying and mapping efforts of traditional rural landscapes;
- a proposal of a set of guiding structural elements and characters, configuration and elements, at the landscape and stand-system level that define these systems and landscapes and allow it to be recognized.

This paper works to identify the defining features of the polycultural systems and landscapes by following the historic development of this landscape, beginning with a historic description of the territory of Sicily (Central Mediterranean) as case study, in which all of the defining features of this complex landscape come together.

2.2 Origin and Historical Path of the Mediterranean Garden and Polycultural Landscape

During its slow evolution over the millennia, the Mediterranean agricultural landscape characterized by the presence of trees maintained some of its initial properties from the foundation of its unique tradition: its peri-urban (just outside a village, quarter, or city) closed and protected location, its polycultural and polyspecific make-up, its irrigated and multifunctional character, its close relationship to culture and its continuous use as a source of artistic inspiration. We know from Shay et al. (1992, cit. in Blondel and Aronson 1999) that a peri-urban landscape made up of cultivated fields and fruit orchards alternating with wooded areas, such as those that can still be seen today in the various parts of the Mediterranean from the Iberian peninsula and Southern France in the West (Firmino 1999; Pinto-Correia and Vos 2004; Sirami et al. 2010) all the way to the far eastern regions (Braudel 1986; Kaldjian 2004; Kizos and Koulouri 2006), was already present in the ancient polycultural landscape located in the peri-urban areas of the island of Crete during the 4–3 millennium B.C. This fragmented landscape is both temporally and spatially heterogeneous because of its environmental, climatic and topographic variability and its interactions with various historic events and cultures (Naveh and Liebermann 1994; Cowling et al. 1996; Pinto-Correia and Vos 2004; Blondel 2006). These interwoven semi-natural and cultivated landscapes have been the cradle of man's relationship with nature for thousands of years and are real biodiversity hotspots due to their exceptional number of endemic and cultivated species. The three main crops—grapes, olives and grains (e.g. Olmo 1995; Terral 2000), are those which Braudel (1986) defined as the “trinity born from the union between climate and history”—however, in general, there is a great diversity of crops which has determined the area's food security and ecological stability over the centuries (Loumou and Giourga 2003). This diversity was created by history (with the main contributions being, in brief, the pre-Classical and Classical introduction of Asiatic species, the Islamic “agricultural revolution”, the introduction of American species and finally the introduction of the species that arrived via the activities of plant collectors and

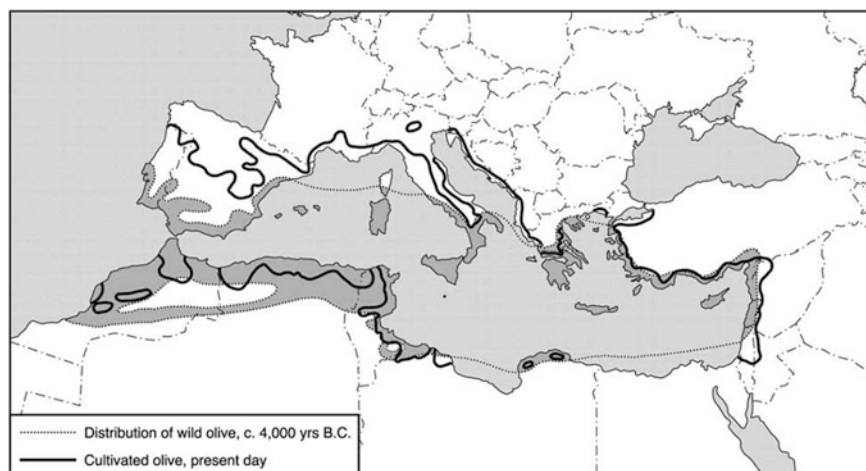


Fig. 2.1 Physical and biological delimitation of the Mediterranean region: the olive tree (wild and cultivated) is probably the most representative indicator of the mediterraneity and its related rural landscape (source Zohary 1995)

European scientific institutions) and by the Mediterranean's heterogeneous environmental characteristics. However, the Mediterranean landscape was unified by a climate so perfectly adapted to wild and cultivated tree and shrub species (Fig. 2.1) that their cultivation represents "a sort of natural monopoly" (Bevilacqua 1996). The most famous polycultural garden of the Mediterranean rural landscape tradition from the classical age is that of Alcino, in the *Odyssey*:

"Outside the gate of the outer court there is a large garden of about four acres with a wall all round it. It is full of beautiful trees—pears, pomegranates, and the most delicious apples. There are luscious figs also, and olives in full growth Pear grows on pear, apple on apple, and fig on fig, and so also with the grapes, for there is an excellent vineyard In the furthest part of the ground there are beautifully arranged beds of flowers that are in bloom all the year round. Two streams go through it, the one turned in ducts throughout the whole garden, while the other is carried under the ground of the outer court to the house itself, and the town's people draw water from it". (Homer, trans. Butler 1900). Another Homeric garden is that of Laertes, Odysseus's father—a "great orchard" (Ibid.) surrounded by a dry stone wall. For example, in the Italian landscape (which is very representative of the entire Mediterranean area's geography, environmental variability and history), the presence of fruit trees is generally celebrated with authoritative testimonies by the geponic Latin writers: Columella, Pliny the Elder and Terrensius Varro. In *Rerum Rusticarum*, Varro symbolically asks: "Is not Italy so covered with fruit trees that it seems one vast orchard?" (Varro, trans. Fairfax 1918). Fruit trees can be effectively identified as the most distinctive trait showing environmental diversity as well as the complex course of human history so clearly legible in the traditional Mediterranean landscapes.

The Greek model—an enclosed polyspecific garden, with a regular planting distance between trees—is also found in the Roman landscape in the form of small fruit and vegetable gardens (*hortuli*), which surround the city where temporary dwellings (*tabernae*) house worshippers of the sacred Lares (Grimal 2000). The economic and territorial growth of the Roman Empire lead to the adoption of Oriental paradise garden models, containing both useful and ornamental species and a strong architectural and monumental component that would mark the style of the Renaissance as well as the later Neoclassical gardens in future centuries. The mixed fruit crops of the *hortuli* would be the hallmark of what would be the Italian agricultural landscape *par excellence*, that of the *coltura promiscua* which overlays trees with grains, combining permanent crops with temporary herbaceous crops and natural patches (forest, woodlot, *macchia Mediterranea*, etc.), and occurring in a variety of forms. One of the most complex, for example, being the *alberata* (Desplanques 1959) in Central Italy, a mixed cultural system that trains grapevines on living trees (Agnoletti 2013). In Southern Italy, extraordinary examples of *coltura promiscua* which still survive are the terraced almond orchards of Gargano (Apulia) and the carob orchards of the province of Ragusa (South-eastern Sicily) (Barbera et al. 2010). Further development, both in terms of biodiversity and cultivation techniques, would come to the Mediterranean polycultural and polyspecific garden and its relative landscape, from the Arabic agricultural revolution between the ninth and twelfth centuries. In Sicily, the Caliphates and the Norman kings adopted Islamic landscape styles and agricultural systems in their gardens and parks where “business is mixed with pleasure, with science and with the arts” (Watson 1983). They were the privileged sites of the introduction of new species and techniques. This innovation does not regard a specific species or technology, but a systemic change in the vision of the agricultural system and its landscape—defined as a space in which different technologies (machines and hydraulic systems, mills, land improvement, rotations, inter-cropping, crops) contribute to a better use of water resources, a temporal and spatial differentiation of production and the connection of the various irrigation, energy, micro-climate and aesthetic functions into a system (Barbera 2005; El Faïz 2005; Cressier 2006). Citruses would begin to spread throughout the gardens and parks of the Mediterranean. Their presence would most define the characteristics of the Mediterranean landscape and affirm its place in the European imagination—not because of the vast number of trees, bath for the utilitarian or beauty products made from them—as a place of scenic beauty and eternal spring (Barbera 2000). In recent classifications of European landscapes of historical interest, this type of landscape is generally defined as the *huerta* or as one of its components (e.g. Courtot 1989; Meeus 1995; Zimmermann 2006).

The Mediterranean landscapes would increase their biodiversity again when new species were brought in by the conquest of the American continent: the most important for its impact on the natural and rural landscape would be the cactus pear (Barbera et al. 1992). Gardens would once again be the sites where unknown plants were introduced and would subsequently affect European culture, some whose botanical characteristics were totally unknown, and others who were previously considered poisonous. In reference to the Italian territory in particular, in the next

century fruit orchards, in various land mosaic pattern, would find a privileged place in the South. Apart from the small plots belonging to rich peasants or the middle-class bourgeois, “there was also the more massive initiative of feudal and ecclesiastical lords, whose possessions almost always contained gardens and preserves (*starze*), closed and well-defended plantations destined for the pleasure of the lords and to increase their revenues”. (Sereni, trans. Litchfield 1997). The oldest records date back to the sixteenth century when Leandro Alberti (quoted. Bevilacqua 2000, trans. authors) writes of Ostuni’s specialized orchards in Apulia (South-eastern Italy): “one sees many trees and lots of almonds planted in this way, how marvellous to consider that it was possible for so many trees to be planted by those men”. In the 1500s, what is believed to be the first treatise specialized in fruit cultivation in the world was written in Southern Italy (Janson 1996): in *Agriculture Opusculum*, the Sicilian Antonino Venuto (1516, trans. authors) focuses on the typical species of southern fruit as well as a newcomer, “The orange, king, prince and master of all trees”. Specialized fruit cultivation would be further established in the southern regions of Italy over the next centuries, especially after the crisis of the *latifundium* (large estates). Fruit trees (almonds, olives) and grapes would become the protagonists of the transformation of the South and its agricultural landscape (with terracing, hydraulic management, stone-clearing and stone-made artefacts), creating a more patched land mosaic. The South would participate in the agricultural revolution of the nineteenth century that transformed the European countryside with its fruit trees. While in Northern Italy, the same revolution would regard the spread of crop rotation with foraging, especially on arable land (Bevilacqua 1996). Finally, Southern Italy’s countryside landscapes were finally made accessible by the spread of steamship and railroad connections and have been an integral part of European culture since the end of the eighteenth century. At the end of their *Grand Tour*, young German, French and British intellectuals spread the myth of the Mediterranean landscape. The polycultural and polyspecific *Mediterranean garden* landscape would keep these same distinctive characteristics until the crisis of *agricoltura promiscua*, and the phenomena of urbanization in the 1960s/1970s. The spread of industrial models destined to fail and devastating construction speculation along the coastal plains and in the peri-urban areas would devastate the landscape’s beauty and production. The effects of this cataclysmic change can be seen today in degraded agricultural landscapes and systems that are no longer efficient in terms of their production or in terms of their environmental sustainability and cultural impact. However, in recent inventories and catalogues of European landscapes, historical and complex landscapes (*coltura promiscua*, polyspecific gardens) are important still today in various parts of the Mediterranean (e.g. Firmino 1999; Kizos and Koulouri 2006; Pinto-Correia and Vos 2004; Sirami et al. 2010). Once again, looking for example at national level in Italy, the recent Historical Rural Landscape Catalogue (Agnoletti 2013) highlights many extraordinary examples of still surviving complex and polyspecific landscapes. According to the main statistics of this catalogue, about the 40 % of the national historical landscapes of Italy are characterized by mixed crops and inter-crops, as an expression of different gradation of *coltura promiscua* land mosaic pattern. So that, today many of these

landscapes are distributed along the entire Italian peninsula. To cite some of most important examples that express their polycultural character and complexity, already in their denomination (Agnoletti 2013): the “Terraced and irrigated chestnut groves and vegetable gardens in Alta Valle Stura” (Liguria, Northern Italy); the “Landscape mosaic of Montalbano” (Tuscany, Central Italy); the “Polyculture of Loretello” (Marche, Central Italy); the “Mixed hill cultures of the lower Irpinia”, the “Terraced orchard-gardens of the hills of Naples” (Campania, Southern Italy); the “Mixed orchards of the Temples Valley”, the “Polyculture on the slopes of Mt. Etna” (Sicily, Southern Italy). The general distribution shows an increasing importance of these complex systems of land use/cover types, and related patched landscapes, moving from Northern Italy to the South (in the Central Mediterranean Basin).

2.2.1 The Mediterranean Garden and Landscape Definition Requires Clarification

The word “garden” (“*giardino*” in Italian, “*jardin*” in French) with which fruit orchards are frequently defined in the Mediterranean area, goes back to the ancient Indo-Germanic *ghordo*, which means an enclosure, and the Greek *chortos*, Latinized as *hortus* meaning “small cultivated enclosure” (Venturi Ferriolo 1989). The confined space allows for the trees and the factors affecting their production to be kept under control; it is where man reaffirms and refines his supremacy over a friendly and collaborative nature, who, in return, rewards him with the very best she has to offer, her fruits (Barbera 2007). According to Sereni (1961), in typically Mediterranean regions, such as Sicily and Southern Italy, the origins of the Mediterranean garden can be found in the Classical period, with the colonization of Magna Graecia, as much as in the subsequent Arabic colonization (between the ninth and twelfth centuries). This shows how multi-temporal and complex the evolutionary process that shaped the Mediterranean garden landscape was.

In the example of an in-depth study of Sicily, but also in many other Mediterranean regions, the term “garden” has, at least since the age of the Normans (tenth to twelfth century), referred to an orchard or garden orchard. As shown by the term’s development through history, this has determined its closed nature, the presence of evergreen species and irrigation, and non-production-related uses. It can have the extremely simplified characteristics of the island of Pantelleria’s (Central Mediterranean Basin) “*jardino*” (a single tree—usually a citrus—protected by a dry stone wall that creates a micro-climate that allows the tree to grow without irrigation; this is indispensable in such a profoundly arid Mediterranean edaphic-climatic context (Barbera 2000) (Fig. 2.2a)—thus connecting itself directly to the primitive idea expressed by Venturi Ferriolo (1989) starting from the Sumerian gardens represented by a proto-Elamite pictogram showing a single tree enclosed by a fence (Fig. 2.3). Conversely, if we retrace the historical-cultural events mentioned above, the concept of the Mediterranean garden can be expanded

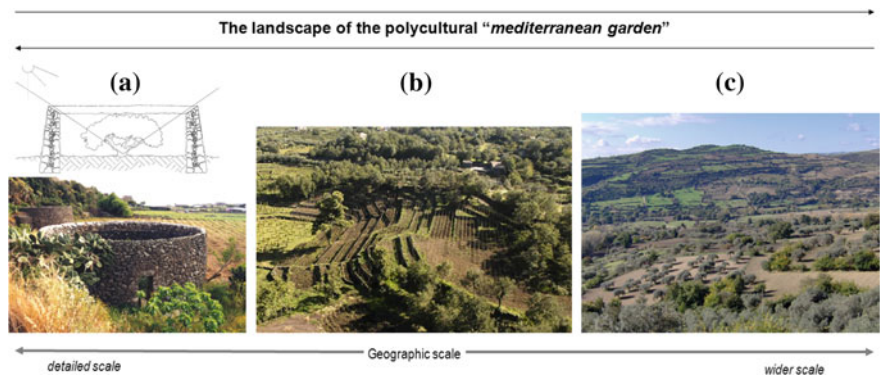


Fig. 2.2 The landscape of the polycultural “Mediterranean garden”: from the protection of a single tree to a complex land use mosaic. Examples: **a** Mediterranean garden of Pantelleria (Sicilian channel), with e single citrus tree enclosed and protected by dry stone artefacts; **b** landscape of the Mediterranean *coltura promiscua* at fine-grained land use mosaic pattern (Noeth-eastern Sicily); **c** landscape of the Mediterranean *coltura promiscua* at coarse-grained land use mosaic pattern at inter-plot level (SE-Sicily)

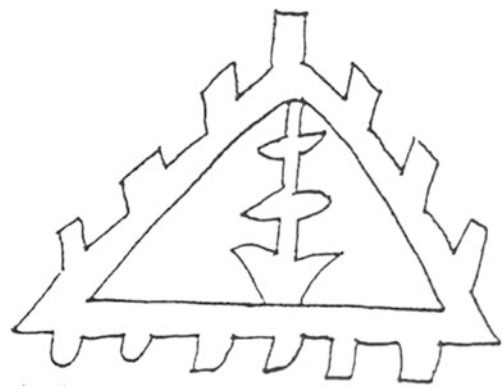


Fig. 2.3 The tree of life enclosed by a Sumerian pictogram from the III millennium B.C. Probably the first representation of a garden design that is still repeated today, for example in the “*jardini*” of Pantelleria (Southern Italy) or in Folegandros (Southern Greece) (*source* Venturi Ferriolo 1989)

and complicated, in terms of its spatial and structural complexity, its organizational forms and in the plants present in it. As Venturi Ferriolo says “planting fruit trees is the proper meaning of the garden” (Ibid.). In fact, for the Mediterranean gardens of Biblical Palestine, to those of Homeric Greece, to the Roman *horti*, to the *noharia*, *sanya*, *xirba* and *bahira* of Islamic Sicily, crop specialization (specialized or mixed) is defined differently according to time and place. This crop (or these crops), tend to be mixed, relatively small and located near the house and settled areas maintaining a polyspecific inter-cropping mosaic pattern of land use, in the large coastal Sicilian citrus groves and, in general, throughout the Mediterranean coastal regions.

For example, in Syracuse (South-eastern Sicily) the word “*giardino*” or garden (Sestini 1963) is substituted by “*paradiso*” or paradise (Trischitta 1983). These citrus landscapes, with that harmonic equilibrium characteristic of a “nature” designed by man, are examples of what Assunto (1973, trans. authors) called a “widespread aesthetic” not contained in a limited space. The same author believed them to be the perfect landscape due to their “simultaneity of flower and fruit”. This simultaneous presence of the “two moments in the plant which represent the playfulness of beauty destined for contemplation and the delectable result of cultivation” is possible due to the coexistence of different trees with different phenologies or the presence of one re-flowering citrus tree (the lemon, being the example *par excellence*). This beauty, together with its useful production (the fruit), therefore represents one of the reasons for its success, its production and landscape are emblematic of the Mediterranean garden. In testimony to this, the historian Lupo (1990) emphasizes the attention that the world of arts and letters has given to the citrus garden. However, the citrus garden, because of its size and shape, does not always maintain the complexity of the mosaic land use pattern that is typical of the larger and more widespread polycultural and polyspecific *Mediterranean garden* sensu (Sereni 1961), and was reduced to one of the many patches that compose it. In this respect, Horden and Purcell (2000) state that the term *Mediterranean garden* is not to be understood as a particular crop type, but, rather as “... a location, a type of use of labour and resources ...”. The Mediterranean garden/orchard is often associated with irrigation (Bolens 1989; Horden and Purcell 2000) and interacts with all aspects of the generally complex and articulated agro- and forest-ecosystem that surrounds it.

This analysis, with its two extremes, can give rise to a semantic confusion that isn't useful for the recognition and better definition of the complex *Mediterranean garden* landscape (Fig. 2.2a–c). Therefore a reflection on today's idea of these landscape, which contains various landscape types and different definitions (from Pantelleria's cell-like garden to the larger citrus plantations, from small mixed orchards to the varyingly large and complex mosaics of Mediterranean polyculture—*coltura promiscua*, from both principally ornamental gardens to productive ones) is therefore considered useful (Fig. 2.2).

2.3 The Mediterranean Garden and Polycultural Landscape as Cross-Reference Type in Current Landscape Inventories and Typologies

In order to better understand the complexity of the landscape and the large environmental value inherent in the historical definition of the polycultural systems and landscapes (in terms of complexity, structure and function), it may be useful to refer, where possible, the typology of these landscapes to the different recent inventories of the Mediterranean landscape that have been defined at the national

and international level. For example, studies have been carried out over the last few decades, both in order to provide national landscape inventories (Blasi et al. 2000; Bunce et al. 1996; Pinto-Correia et al. 2002; Agnoletti 2013) as well as to define what connects them in typological terms and terminology (Meeus 1995; Zimmermann 2006; Múcher et al. 2010). However, only a few examples and experiences of landscape typologies have exclusively concerned the Mediterranean area (Vogiatzakis 2011), and existing inventory are not fully able to identify traditional cultural landscapes (Solymosi 2011). One of the most important typologies at the European level is the typological prospect proposed by Meeus (1995), which identifies the following major landscapes for the Mediterranean area (Table 2.1): *Mediterranean open field*, *Coltura promiscua*, *Mediterranean semi-bocage*, *Montado/Dehesa*, *Delta and Huerta*, *Terraces* and *Mountains*. Again, Pinto-Correia and Vos (2004) describe the following main traditional multifunctional landscapes for the Mediterranean area: the *Pastoral and forestry landscapes where transhumance takes place* (in a Mediterranean-montane climate), the *Small-scale mixed farming landscapes with marshes* in North-eastern Portugal (Atlantic–Mediterranean mountain climate), the *Coltura promiscua with métayage (share-cropping)* in Central Italy (Mediterranean climate Submediterranean hills), the *Chestnut grove landscapes* in France and Italy (Submediterranean hills and mountains climate), and the *Landscapes with montados and dehesas* in Southern Portugal and Spain (Mediterranean-continental climate plains). Many of these take on a strong European identity at the regional level and are consequentially considered *Regional Landscapes* (e.g. the *Coltura promiscua*, the *Montado/Dehesa*, the *Huerta*, etc.) (Meeus 1995). The complexity and importance of the *Mediterranean garden* described above regards many of these landscape types in practice (Table 2.1).

If we go to the national scale, only a few heterogeneous (in their methodological approach) published inventories are available. For example, looking at the Italian nation (Barbera and Cullotta 2009) and more specifically at Sicily (which is quite representative of the rest of the Central Mediterranean Basin in terms of its geography, morphology, environment and according to historic and cultural development described above), it is possible to highlight the presence of a wide range of landscapes. For example, in an analysis that is fundamentally based on physical aspects, Blasi (2007) identifies 34 “Landscape Systems” on the island (27 from the Mediterranean climate region and 7 from the temperate one) out of a national total of 67, making Sicily one of the Italian regions with the highest landscape variability. This wealth of landscapes is also confirmed by the results of the “Geographic Landscapes of Italy” inventory (Amatucci et al. 2001), proving once again that Sicily is one of the regions with the highest number of landscapes (13), as well as by the “Type and Unit Map of the Physiographical Landscapes of Italy” (*Carta della Natura* Project, APAT 2003) which identifies 37 types of landscapes grouped into 5 major physiographic units. These landscape inventories are primarily based on physical elements (geomorphology, lithology and hydrography) although they also consider anthropic elements (i.e. main soil covers and land use). Recently a first survey ever done on the traditional rural landscapes of

Table 2.1 Types of traditional Mediterranean rural landscapes at different scales (i.e. Meeus 1995; Barbera and Cullotta 2012), and their relative most representative characters (physiography, crop/cover types, rural architectures), compared to the transversality inherent in the definition and historical path of the polycultural Mediterranean garden

Main traditional landscapes of Europe (Mediterranean Europe) (after Meeus 1995)	Main traditional landscapes of Sicily (after Barbera & Cullotta 2012)	Most representative characters:		Transversal importance of Mediterranean garden characteristics
		land morphology	crop/vegetation cover	
(at sub-national / regional)				
Mediterranean open land	Mediterranean open land	plains, rolling hills	wheat, natural pasture	isolated human settlements
Cultura promiscua	Cultura promiscua	various (marginal lands are frequent)	mixed crop and orchard, olive, almond, citrus, orchards, vineyard, hazelnut, pistachio, ash tree, patches of natural vegetation	diffused human settlements and considerable presence of rural architectures (stone-made terraces, enclosures, pathways, etc.)
	Circum-Sicilian islands landscape	various	small mixed crop and orchard	diffused small human settlements and considerable presence of rural architectures (terraces, enclosures, pathways, etc.)
Terraces	Terraced landscape	various (marginal lands are frequent)	Various mixed and specialized crops	considerable presence of terraces and other stone-made artefacts
Huerta Delta	Coastal and sub-coastal landscape with intensive crops	alluvial plains	orange, lemon, mandarin, herbaceous crops	medium presence of rural artefacts
Mediterranean semi-bocage	Mediterranean semi-bocage/semi-open land	plateaus and slopes	olive, carob tree, almond, patches of natural vegetation	medium presence of rural artefacts (enclosures, pathways, constructions of varying size)
Montados/Dehesa	Rainfed specialized fruit tree landscape	plains, rolling hills and lowlands	olive, almond, vineyard	isolated human settlements
Mountains	Forest mountain and sub-mountain landscape	Mountains	forest, other wooded lands	Rare/isolated rural constructions (to shelter people and animals)
	High-mountain natural landscape	Mountains and peaks	open land, high-mountain shrubs	None rural architecture

Italy (Agnoletti 2013) based on a more diversified environmental approach, including also cultural, historical and social aspects; it presents more than a hundred case studies distributed through the country as a preliminary study conducted in view of the compilation of a national register of historical rural landscapes and traditional agro-forestry practices. An initial overview of the main Sicilian macro-landscapes has recently been proposed (Cullotta and Barbera 2011; Barbera and Cullotta 2012) as part of a research project directed towards making the inventory and classification systems for landscapes at different scales homogenous and interconnectable in order to use a more detailed scale at the regional level (i.e. NUTS of II-level—Nomenclature of Territorial Units for Statistics by regional level) for the Sicilian landscapes. Based on a multidisciplinary approach, this typology lends itself to parallels with the landscapes defined by Meeus (1995) and other Authors (e.g. Zimmermann 2006) (Table 2.1) because of its shared nomenclature. In total, nine macro-landscapes (Fig. 2.4) (Barbera and Cullotta 2012) expressive of traditional landscapes have been described for Sicily, that is, land uses and covers that have a long history and that have been subject to slow changes over time (sensu Antrop 1997). In Table 2.1, these most representative landscape characteristics (according to: size, physiography, crop/vegetation cover types, rural architectures and artefacts) are reported for Sicily, and their typological link with the Meeus (1995) landscape types, for an easy upscaling at European level, is given. The aforesaid inventories, and most important characters, show the presence of *Mediterranean gardens* and polycultural systems in various types of traditional rural landscapes, and at various geographic levels (Table 2.1): in the *Coltura promiscua*, in the *Coastal and sub-coastal landscape with intensive crops*, in the

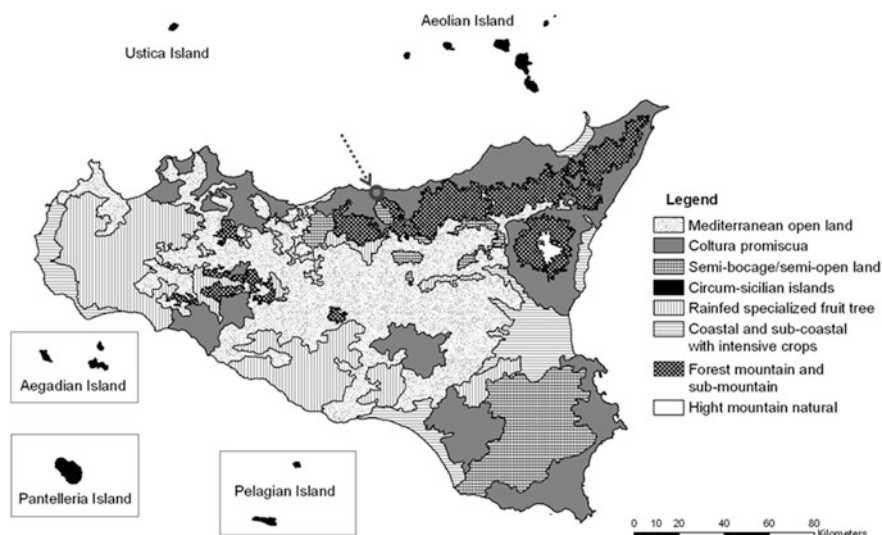


Fig. 2.4 Map of the main traditional landscapes of Sicily (after Barbera and Cullotta 2012); the location of the *Halaesa* site in the northern coast is indicated by the arrow

Mediterranean *Semi-bocage* and, in part, in other types of landscapes. The historical evolution of the definition of the *Mediterranean garden* and polycultural systems has given it, in practice, a multitude of elements that characterize its macroscopic landscape pattern. These classification systems, with their different details and scales, finally make sense of the complexity of the Mediterranean area at any level.

2.4 Variability of the Complex Mediterranean Polycultural Land Mosaic Pattern Characterized by the Presence of Trees

The definitions of the Mediterranean, specifically Italian, rural landscape derived from the historic development described above are attributable to a landscape that is so complex and diverse that it includes several of the major Mediterranean agricultural and agro-forestry landscapes that have been catalogued and described to date. In it, the coexistence of spaces dedicated to agriculture, forest and pasture refer back to the Latin categories of *ager*, *saltus* and *silva*. Geographers such as Vidal de la Blanche (1922 cit. in Claval 2007) or, more recently, historians like Aymard (1992) and landscape ecologists such as Pinto-Correia and Vos (2004) still consider these categories relevant, especially considering that the *ager* not only includes crops but also shrub and fruit orchards, the *saltus* mainly concerns aspects of maquis and garrigue scrublands affected by grazing, while the *silva* is made up of woodlands (where different traditional silvo-pastoral uses are practiced). These are all polycultural systems, composed of agricultural and agro-forestry patches (Cullotta et al. 1999; Barbera and Biasi 2011) that, through wood cutting, felling and the use of branches as animal feed, controlled fires, crop cultivation, livestock and their transhumance, water control and terracing, define the prerequisites—or “the golden rules” (Blondel 2006)—of the ancient Mediterranean agro-silvo-pastoral systems. The above-reported concepts and descriptions of the traditional Mediterranean polycultural (mixed cultivation) landscape in practice generate different spatial combination (i.e. configuration) of the *coltura promiscua*. In fact, according to the presence and location of the plant promiscuity (at least one of them is a tree species), we have different landscape patterns: in the same field (intra-plot) or between fields (inter-plot) (Fig. 2.2). Moreover, this heterogeneity is reinforced by the land mosaic patchiness (i.e. more fragmented or coarser) (Fig. 2.2). Polyculture is an agriculture using multiple crops in the same space, in imitation of the diversity of natural ecosystems and avoiding large stands of single crops, or monoculture. It includes multi-cropping and inter-cropping systems. The “*coltura promiscua intra-plot*” is a multiple cropping, i.e. the practice of growing two or more crops in the same space during a single growing season. Vice versa, the practice of growing two or more crops in proximity (i.e. the inter-cropping) is the expression of the “*coltura promiscua inter-plot*” (Fig. 2.2c).

2.5 Approaching a Polycultural Mediterranean Garden Definition

2.5.1 A First Description of the Complex Mediterranean Rural Landscape: The “Tavola Di Halaesa”

Emilio Sereni’s “*History of the Italian Agricultural Landscape*” (1961, trans. Litchfield 1997) is quite helpful in the search to identify a more comprehensive definition of the polycultural *Mediterranean garden* landscape that includes all of the different historical interpretations that it has gone through. This author attributes the characteristics of the traditional Mediterranean rural tree landscape to the landscape of the “*Mediterranean garden*”, and shows how those characteristics are maintained all the way through time—from the Greek colonization to the post-war agriculture following WWII—remaining well-defined and long-lasting with regard to their formal structure and functional biotic and abiotic elements, their ecological and geographical context, their plurality of functions, their social uses and economic determinants (Sereni 1961). It is a landscape with irregular closed lots ... defined by “*the polygonal irregularity of contours*” (Sereni, trans. Litchfield 1997), that is fragmented, twisted, squished, and formed by a “*tangle of little wooded plots divided by walls or hedges*” (Ibid.). Until the eighteenth century, this landscape was mainly “*restricted (to) suburban or coastal zones. It was thus still isolated amid vast extents of uncultivated land or open fields*” (Ibid.). It was “*an agricultural landscape of closed fields, vineyards, gardens, and fruit trees*” (Ibid.), and often even of arable and pasture land “*imprinted with a suburban physiognomy by dividing walls and the contiguous placement of houses and rustic storage sheds*” (Ibid.). “*Terraced arrangements became the chosen location for the most valuable crops, and particularly for trees and shrubs*” (Ibid.).

For the first time in landscape literature, Sereni (1961) retraces the elements of such mixed and complex forms of agro-forestry systems and landscapes, named *giardino Mediterraneo* (*Mediterranean garden*) starting with the forms and functional characteristics found in the *Tavola di Halaesa* (literally: *Stele of Halaesa*) (Fig. 2.5), a Greek colony founded in 403 B.C. (Northern Sicily), and the plan based on it drawn by Sicca (1924) which provides schematic information on the land use and landscape structure of the city of *Halaesa* (Fig. 2.6) (near the present Tusa) on the Tyrrhenian coast of Sicily (Fig. 2.4), between the second half of III and I B.C., during the establishment of Roman rule and following a probable redistribution of land (Barbera and Cullotta 2014). A reconstruction similar to that one, although more lean but with the same elements, can be seen in the two drawings made by Arangio Ruiz and Olivieri in 1925 (Fig. 2.7a), which graphically portray the information found on both of the columns of the marble epigraph (in total three marbles discovered in different moments: 1558, 1885 and 1958; the first citation by Fazello 1558) published by Torremuzza in 1753 (Burgio 2008). The text and drawings allow a first reading of the area (Figs. 2.6 and 2.7), but to arrive at its more precise definition, in as much as it is a cultural landscape derived from an

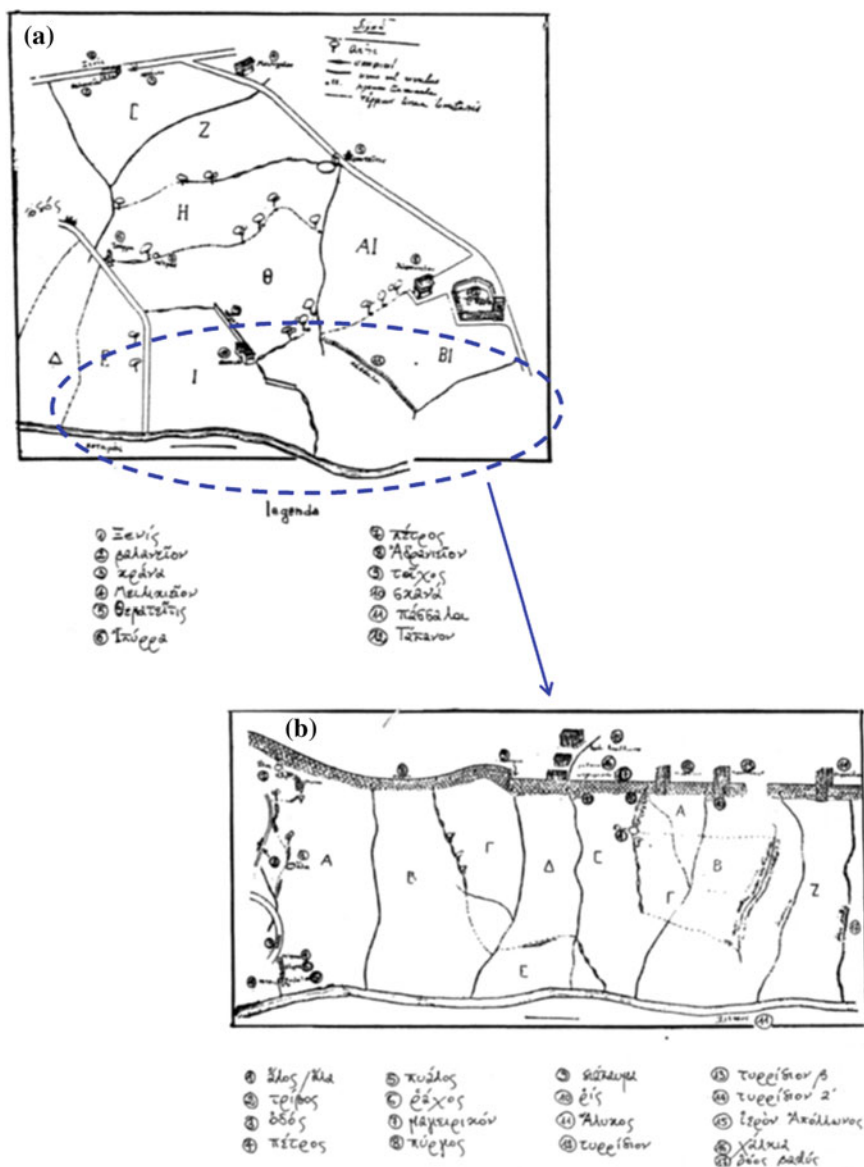


Fig. 2.7 Plan based on the *Halaesa* marble epigraph (a); and (b) landscape characters of the suburban slopes located between the city walls (*top*) and the today “Tusa” river (*lower*) (Greek colony founded in 403 B.C., Northern Sicily). By Arangio Ruiz and Olivieri (1925)

different hypothesis, an oil press. The olive tree is probably also present as a sacred tree. The crop system in areas with a lower slope is that of arable land and wooded pastures following a simple system of fallow fields. The presence of hydraulic

structures, found during archaeological investigations, has made it possible to imagine the presence of irrigated orchards. Some of the other tree species present are: figs, pomegranates, pears and plums. They are certainly grown in *coltura promiscua* but are also used as hedges or grow wild, especially plums and pears. The latter is also used to mark the plot boundaries. Even briars and palisades, stone walls and boulders contribute to score and mark the boundaries by integrating the subdivisions marked by the hydrographical network and roadways. The grapevine is also cultivated. The soil, due to the slope's gradient, had to be at least partially terraced. The livestock present are sheep, goats and pigs. These were kept free range and also fed cork oak acorns, which were also used to tan leather. The forest and maquis saw grazing, hunting, as well as traditional wooden and non-wooden productions. These latter natural patches contributed to the landscape mosaic of the area as core and buffer areas, as well as corridors of the ecological networks.

The long-lasting historical landscape of *Halaesa* shows its polycultural characters still today. Through the centuries and the following historical and cultural processes, this landscape was able to conserve the characters of its foundations, later on enriched by additional and traditional crops and land uses. The landscape is still complex and irregularly patched; with crops, fields and natural cover types expressive of a traditional agro-silvo-pastoral Mediterranean landscape (Fig. 2.8). Currently, the olive grove is the most important cultivation yet. Most important



Fig. 2.8 A today view of the *Halaesa* area with an example of intra-plot mixed cultivation (*giardino Mediterraneo—coltura promiscua*) at stand level with various cultivated and wild plants (olive, fig, almond, pomegranate, citrus, cactus pear, apricot, peach, walnut, cherry, vegetables, oaks, woodlots of Mediterranean maquis-forests, elements related to the management and the use of water for irrigation)

veteran trees, especially olives, are still today used as historical landmarks, for instance as boundary trees between land properties and fields. The historical rural architecture and artefacts are currently marked by the archaeological site and evidences of the *Alesa* city, small settlements, rural buildings, stone-made boundaries, terraces, enclosures, pathways, aqueducts, etc.

2.5.2 *Landscape Ecology, Multifunctionality and Cultural Heritage of the Complex Mediterranean Agro-Silvo-Pastoral Landscape*

The historical and cultural importance of the *Halaesa* landscape is not the only thing that justifies the preciousness of these landscapes or the traditional farming practices that allow for their perpetuation. In fact, their strategic role in the preservation of a multifunctional agro-ecosystem ensured by the sustainability of the agricultural practices congenital to them is just as recognizable.

First, the complexity of the *Halaesa Tavola's* landscape is caused by the wealth of its physiographic context, common to many areas from West to East, from North to South bordering the Mediterranean (e.g. Braudel 1986). The city of *Alesa* is located on one of the foothills of the Tyrrhenian Nebrodi Mountains in a position close to the coast (see Fig. 2.4). The heterogeneous physiographic and environmental characteristics, following a hypothetical NS transect, clearly show that the territorial complexity results from the contact between very different environments, ranging from coastal to mountain ones. A great morphological diversity is expressed by plateaus, hills, summits, coastal and sub-coastal areas, rivers, etc. and results in an equally great biological and soil diversity contributing to the richness of each individual ecosystem as well as to that which comes from the ecotone relationship between the natural and cultivated patches.

The city's central location within the wider Mediterranean geographical area and human history have both contributed to further increasing the complexity and diversity that has made *Halaesa* a frontier town, and therefore a place of exchange between Sicilians, Greeks, Carthaginians and Romans marked by a multiculturalism that Cusumano (2006) applies to the sacred cults but that can also be applied to a plurality of agro-ecological knowledge (different species and varieties, agricultural techniques, etc.). The fact that *Halaesa* was an active centre of exchange and biological and cultural hybridization is also due to its location near the sea and along the NS coast of Sicily, an important route for the transportation of agricultural products from the hinterland to the coast (mainly wheat: during the Roman period, Sicily was considered the granary of Italy) as well as its location on the E–W coastal connection (see Fig. 2.4).

From this physical, geographical and historical diversity, a large, complex and heterogeneous mosaic follows, consisting of irregular patches of different shapes and sizes, with different morphological and typological traits in relation to their

position in the area (plains, hilly areas, etc.), soil use (forest, scrub, grassland and cereal crops, tree crops, shrubs and presumably mixed and specialized vegetable gardens and orchards), the spatial and temporal succession (rotations, alternations, transhumance). The patches were enclosed by hedges and groups of trees and shrubs, or by non-living barriers (walls, palisades) or separated from natural or semi-natural areas by *buffers*. Linear structures in the form of ecological corridors—rivers, ditches, aqueducts, living and non-living barriers and terraces—are additional elements that diversify the ecosystem by functioning as ecotones. Further biodiversity comes from large boulders, piles of stones, isolated trees, which not only provide agricultural products but also ensure shade and shelter from the rain for humans and animals alike, and act as micro-sites with the function of *stepping zones* for a countless number of plants and animals.

The *Halaesa* landscape is the result of a polycultural Agro-silvo-pastoral system which, observed under the lens of *landscape ecology*, highlights very positively in terms of complexity and richness with reference to specific and intraspecific biodiversity, and the ecosystem's structure.

In Table 2.2 all the detailed information reported in the two columns of the marble epigraph are given for this case study, and grouped according to the following main aspects of the landscape ecology (e.g. see Forman and Godron 1986; Farina 1998): shape of patches, patchiness, crop types, core areas and buffer areas, corridors and ecological network, linear and point elements, rural architecture and other stone-made artefacts. It is possible to locate these main landscape elements to the different lots (about twelve) in which the *Halaesa* landscape is divided. Thus, while the left column of the marble describes the city's lots located on the north-eastern side of the area, the western and south-western part is described on the right column (see Table 2.2). The information reported in this last column describes a more complex and structured land mosaic comparing to the other part of the city and surroundings. Each lot is in detail described by both natural and artificial boundary lines of fields and patches (small streams, creeks, holes, trenches, rocks, trees, woodlots, stone pathways and vias, sacred areas, urban walls, etc.) (Table 2.2), although no details are given on its dimension and shape. The temporal and spatial complexity of the *Halaesa* land mosaic manifests itself in the economic productivity and environmental services that participate in that multifunctionality belonging to complex Mediterranean agricultural and agro-forestry systems (Firmino 1999; Barbera et al. 2004; Pinto-Correia and Vos 2004; Blondel 2006; Eichhorn et al. 2006; Kizos and Koulouri 2006; Brown et al. 2007; Biasi et al. 2012; Otero et al. 2013; Agnoletti 2013). Agricultural production and forestry, such as animal breeding, are carried out in a context of environmental protection that comes from the high biodiversity and the complex structure of the fields and their relationship in a network of connectivity (Fig. 2.7) with the woodland and scrub areas. The water cycle is assured by the territorial hydrographical and hydraulic structures that contribute, with the terraces, to protect the soil and slope stabilization. The organic matter cycle is guaranteed by the presence of mixed crops and the integration of crops/livestock/woodlots. These landscape material elements and characters are visually (at least, but many other functional aspects are involved)

Table 2.2 Landscape patches and elements, grouped in main landscape ecology aspects, reported in the *columna dextera* (Dx) and *latus sinistrum* (Sx) of the *Tavola di Halaesa* (Greek colony founded in 403 B.C., Northern Sicily), that describes the landscape Between The Second Half of III and I B.C. (after Barbera and Cullotta 2014)

Landscape elements reported in the column Dx	Landscape elements reported in the column Sx
<i>Shape of patches</i>	
/	Irregular and twisted division of field plots
<i>Patchiness and crops</i>	
<ul style="list-style-type: none"> • Olive groves all around the main sectors of the city and presence of olive nursery • Vineyard, fruit trees (pear, pomegranates, figs) • Sheep–caprine livestock systems • Grazing lands 	<ul style="list-style-type: none"> • Patched land mosaic and closed fields • Olive groves all around the main sectors of the city and presence of olive nursery • Grapes, olive groves, pomegranates, figs, • Fruit orchards, vegetable gardens, closed fields • Grain growth • Arable land and mixed arable–olive systems • Sheep–caprine farm (livestock) • Pastuelands
<i>Core areas and buffer areas</i>	
/	<ul style="list-style-type: none"> • Cork oak (patches of different size) • Other woodlots and shrublands • Mediterranean maquis
<i>Corridors and ecological network</i>	
<ul style="list-style-type: none"> • River (<i>the today Tusa river</i>) • Mediterranean riparian vegetation 	<ul style="list-style-type: none"> • Streams, rivers and riparian mediterranean vegetation
<i>Linear and point elements</i>	
<ul style="list-style-type: none"> • Small stream • Hedgerows, plums & pears (wild and cultivated) • Wild pears and thorn hedgerows (<i>rhamnoi</i>) (as field boundary) • Holes (natural) and trenches (artificial) • Boundary rocks 	<ul style="list-style-type: none"> • Small streams, creeks, springs, holes (natural) and trenches (artificial) • Aqueduct lines • Wild pears and hedgerows (<i>rhamnoi</i>) (as field boundary) • Other wild trees and fruit trees as boundary (big olive, pomegranates, figs) • sacred trees
<i>Rural architecture and other stone-made artefacts</i>	
<ul style="list-style-type: none"> • Rural buildings • Fortified walls (<i>pyrgos</i>) • Public fountains, landry, drinking trough • Viability network • Terraces • Trench (artificial) 	<ul style="list-style-type: none"> • Rural buildings • Fortified walls (<i>pyrgos</i>) • Sheds and storerooms for agronomic cultivation tools • Tower • Canals (of “U”-shape of cut stone or <i>terracotta</i>; <i>terracotta</i> tubes) • Public fountains, landry, drinking trough • Sacred areas • Stone pathways and vias • Stone-made terraces • Stone-paved farmyards
<i>other</i>	
	<ul style="list-style-type: none"> • Poles for grapes

reinforced by the presence of stone walls and other artefacts or features such as: countless types of rural buildings (country residences, storeroom for fruit conservation, wine cellar, storeroom for agronomic cultivation tools, terraces, hedgerows, canals, stone heaps, etc. (Grove and Rackham 2002; Brown et al. 2007; Petanidou et al. 2008; Barbera and Cullotta 2012). Along with the multifunctional and environmental production, these spaces also have a cultural production shown by indirect literary references (Theocritus, cf. Belvedere 2008), and more generally contribute to the complex and rich *non-material heritage* (dialects, music, narratives, toponyms, etc.) (Scazzosi 2004; Moreira et al. 2006; Cullotta and Barbera 2011; Otero et al. 2013) and the appeal that is characteristic of polycultural Mediterranean agricultural systems.

2.6 Conclusions

The long-lasting, complex- and mixed forms of agro-forestry systems and landscapes, such as the polyculture (*coltura promiscua*), is ascribable and can be associated with different and innumerable agricultural land uses and different kinds of landscape configurations. These landscapes have developed from the intricate historic processes that have produced their cultural identification and evolution over the passage of time. The pre-Classical and Classical introduction of Asiatic species, the Islamic “agricultural revolution”, the introduction of American species, the introduction of the species that arrived via the activities of plant collectors and European scientific institutions were most important historic milestones in this long-lasting process. The historic development traced above and the approaches currently used to classify, map and characterize the principal agrarian and agro-forestry landscapes in the Mediterranean context requires some reflection, so that even these latest useful and indispensable landscape inventory tools can better help define and unquestionably individuate those historic landscapes typical to the Mediterranean context, which are now, more than ever, subject to processes of abandonment and transformation.

The analysed *Halaesa* landscape, located in the geographic centre of the Mediterranean Basin, as one of the first historical detailed description of a complex Mediterranean rural landscape, is the result of a polycultural agro-silvo-pastoral system which guarantees complexity and richness (in terms of structural and biological diversity), as well as with reference to others environmental, cultural and economic aspects.

The presence of historical features, of traditional crops and land uses, of traditional land management and the conservation of architecture and other material cultural heritage related to the agricultural activity (i.e. historical rural monuments, rural country houses and settlements, terraces, stonewalls and related rural artefacts, agricultural and forestry tools and machines, manuscripts, poems, paintings and pictures), as well as non-material cultural heritage (e.g. dialects, music, narratives, etc.), are particularly important aspects considered by international and European

organization toward their valorisation and conservation. This knowledge of traditional landscapes and of the polycultural *Mediterranean garden* landscapes in particular, is particularly urgent. A nomenclatural and characterizational definition that is preferably as holistic (multidisciplinary) as possible needs to be developed with the aim of individuating and planning strategies that conserve the landscape's characteristics, functions and identity. This theme is quite present in the PAC, as demonstrated by the recent indications of the European Council relative to its strategic orientation concerning rural development that should reflect the multi-functional role that the agricultural activity carries out in terms of the richness and diversity of the landscapes, of food and cultural (material and immaterial) products and natural heritage. Their constitutive complexity and multifunctionality should be dealt with from different points of view so as to reflect their over all inter-cultural value.

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References

- Agnoletti M (2013) Italian historical rural landscapes: dynamics, data analysis and research findings. Springer, Dordrecht
- Amatucci M, Buscaroli A, Degli Esposti AV, Gheparidi M, Rosetti-Vianello G (2001) Paesaggi geografici—Territorio senza confini nel sistema informativo scolastico. Ministero Ambiente, Ministero Pubblica Istruzione, ANPA, Ministero Difesa, Roma
- Antrop M (1997) The concept of traditional landscapes as a base for landscape evaluation and planning. The example of Flanders region. *Landscape Urban Plan* 38:105–117
- Antrop M (2005) Why landscapes of the past are important for the future. *Landscape Urban Plan* 70:21–34
- APAT (2003) Il Progetto Carta della Natura alla scala 1:250.000: Metodologia di realizzazione. APAT, Manuali e Linee Guida 17, Roma
- Arangio Ruiz V, Olivieri A (1925) *Inscriptiones Graecae Siciliae et infimae Italiae ad jus pertinentes*. Milano
- Assunto R (1973) *Il Paesaggio e l'Estetica*. Giannini, Napoli
- Aymard M (1992) Spazi. In: Braudel F (ed) *Il Mediterraneo*. Lo spazio, la Storia, gli uomini, le tradizioni. Bompiani, Milano, pp 123–144
- Barbera G (2000) L'Orto di Pomona. Sistemi tradizionali dell'arboricoltura da frutto in Sicilia. L'Epos, Palermo
- Barbera G (2005) Agricoltura e paesaggio nella Sicilia arabo-normanna. *I Geografili*, Serie VIII 1:597–608
- Barbera G (2007) L'albero da frutto nel paesaggio agrario del giardino mediterraneo. In: Sansavini S (ed) *Nuove frontiere dell'arboricoltura italiana*. Perdisa Editore, Bologna, pp 83–96
- Barbera G, Biasi R (2011) I paesaggi agrari tradizionali dell'albero: il significato moderno di forme d'uso del suolo del passato. *Italus Hortus* 18:23–40

- Barbera G, Carimi F, Inglese P (1992) Past and present role of the Indian-fig prickly-pear (*Opuntia ficus-indica* (L.) Miller, Cactaceae) in the agriculture of sicily. *Econ Bot* 46:10–20
- Barbera G, Cullotta S (2009) Classificare i paesaggi culturali tradizionali: criteri metodologici e applicazione (Inventing traditional cultural landscapes: methodology and application). In: AISF, Congresso Nazionale Selvicoltura, vols II–III, Florence, pp 960–967
- Barbera G, Cullotta S (2012) An inventory approach to the assessment of main traditional landscapes in Sicily (Central Mediterranean Basin). *Landscape Res* 37:539–569
- Barbera G, Cullotta S (2014) The Halaesa landscape (III B.C.) as ancient example of the complex and bio-diverse traditional Mediterranean polycultural landscape. *Landscape Hist* 35:53–66
- Barbera G, Cullotta S, Pizzurro G (2004) Agroforestry systems of Mt Etna, Italy: biodiversity Analysis at landscape, stand and specific level. In: Marchetti M (ed) *EFI Proceedings of monitoring and indicators of forest biodiversity in Europe—From Ideas to Operationality*, vol 51, Joensuu, pp 481–492
- Barbera G, Cullotta S, Rossi-Doria I, Ruhl J, Rossi-Doria B (2010) I paesaggi a terrazze in Sicilia: metodologie per l'analisi, la tutela e la valorizzazione. In: ARPA Sicilia, Collana Studi e Ricerche, vol 7, Palermo
- Belvedere O (2008) Paesaggio catastale, paesaggio letterario e archeologia del paesaggio. Tre percezioni a confronto. In: Burgio A (ed) *Il paesaggio agrario nella Sicilia ellenistico-romana. Alesia e il suo territorio*, L'Erma di Bretschneider, Roma, pp 1–10
- Bevilacqua P (1996) Tra natura e storia. Ambiente, economie, risorse in Italia, Roma
- Bevilacqua P (2000) Il linguaggio degli alberi nel paesaggio agrario meridionale. *Italus Hortus* 7:7–9
- Biasi R, Botti F, Barbera G, Cullotta S (2012) The role of mediterranean fruit tree orchards and vineyards in maintaining the traditional agricultural landscape. *Acta Horticulturæ* 940:79–88
- Bignal EM, McCracken DI, Corrie H (1995) Defining European low-intensity farming systems: the nature of farming. In: McCracken DI, Bignal EM, Wenlock SE (eds) *Farming on the edge: the nature of traditional farmland in Europe*. Joint Nature Conservation Committee, Peterborough, pp 29–37
- Blasi C (2007) Biodiversity and landscape. In: Blasi C, Boitani L, La Posta S, Manes F, Marchetti M (eds) *Biodiversity in Italy—contribution to the national biodiversity strategy*. Palombi, Roma, pp 97–103
- Blasi C, Carranza ML, Fronzoni R, Rosati L (2000) Ecosystem classification and mapping: a proposal for Italian landscapes. *Appl Veg Sci* 2:233–242
- Blondel J (2006) The 'design' of Mediterranean landscapes: A millennial story of humans and ecological systems during the historic period. *Hum Ecol* 34:713–729
- Blondel J, Aronson J (1999) *Biology and wildlife of the Mediterranean region*. Oxford University Press, Oxford
- Bolens L (1989) L'irrigation en al-Andalus: une société en mutation, analyse des sources juridiques (les "nawâzil" d'al-Wansharîsi). *El agua en zonas áridas: arqueología e historia*. Instituto de Estudios Almerienses, Almería, pp 71–87
- Braudel F (1986) *Civiltà e imperi del Mediterraneo nell'età di Filippo II*. Einaudi, Torino
- Brown RD, Laforteza R, Corry RC, Leal DB, Sanesi G (2007) Cultural patterns as a component of environmental planning and design. In: Hong SK, Nakagoshi N, Fu BJ, Morimoto Y (eds) *Landscape ecological applications in man-influenced areas: linking man and nature systems*. Springer, Dordrecht, pp 395–415
- Bunce RGH, Barr CJ, Gillespie MK, Howard DC (1996) The ITE land classification: providing an environmental stratification of Great Britain. *Environ Monit Assess* 39:39–46
- Burgio A (2008) *Il paesaggio agrario nella Sicilia ellenistico-romana. Alesia e il suo territorio*. L'Erma di Bretschneider, Roma
- Butler S (1900) *The Odyssey*. <http://www.gutenberg.org/ebooks/1727>, Accessed 14 Mar 2013
- Claval P (2007) About rural landscapes: the invention of the Mediterranean and the French school of geography. *Die Erde*, Berlin, pp 7–23
- Courtot R (1989) *Campagnes et villes dans les huertas valencienues, mémoires et documents de géographie*. Editions du CNRS, Paris

- Cowling RM, Rundel PW, Lamont BB, Arroyo MK, Arianoutsou M (1996) Plant diversity in Mediterranean-climate regions. *Trends Ecol Evol* 11:352–360
- Cressier P (2006) La maîtrise de l'eau en al-Andalus. Paysages, pratiques et techniques. Casa de Velazquez, n° 93, Madrid
- Cullotta S, Barbera G (2011) Mapping traditional cultural landscapes in the Mediterranean area using a combined multidisciplinary approach: method and application to mount Etna (Sicily; Italy). *Landscape Urban Plan* 100:98–108
- Cullotta S, La Mantia T, Barbera G (1999) Descrizione e ruolo dei sistemi agroforestali in Sicilia. In: Authors Various (ed) Secondo Congresso Nazionale di Selvicoltura, Venezia, Italy. EdAs, Italy, pp 429–438
- Cusumano N (2006) Culti nelle Tabulae Halaesinae: continuità e interculturalità. In: Various Authors (eds) La Sicilia romana tra Repubblica e Alto Impero. Atti del Convegno di Studi, Caltanissetta, Italy, pp 72–90
- Desplanques H (1959) Il paesaggio rurale della coltura promiscua in Italia. *Rivista Geografica Italiana*, pp 29–61
- Di Castri F, Goodall DW, Spechi RL (eds) (1981) Mediterranean-type shrublands. Elsevier, Amsterdam
- Eichhorn MP, Paris P, Herzog F, Incoll LD, Liagre F, Mantzanas K, Mayus M, Moreno G, Papanastasis VP, Pilbeam DJ, Pisanelli A, Dupraz C (2006) Silvoarable systems in Europe—past, present and future prospects. *Agrofor Syst* 67:29–50
- El Faïz M (2005) Les maîtres de l'eau. Histoire de la hydraulique arabe. Actes Sud, Arles (France)
- Fairfax H (1918) Roman farm management, the treatises of Cato and Varro done into English with notes of modern instances by a Virginia farmer. The Macmillan Company, New York
- Farina A (1998) Principles and methods in landscape ecology. Chapman & Hall, London
- Farina A (2000) The cultural landscape as a model for the integration of ecology and economics. *Bioscience* 50:313–320
- Fazello T (1558) De rebus Siculus decades duae. Maida, Palermo
- Firmino A (1999) Agriculture and landscape in Portugal. *Landscape Urban Plan* 46:83–91
- Forman R, Godron M (1986) Landscape ecology. John Wiley & Sons, New York
- Grimal P (2000) I giardini di Roma antica. Garzanti, Milano
- Grove AT, Rackham O (2002) The nature of Mediterranean Europe: an ecological history. Yale University Press, New Haven
- Horden P, Purcell N (2000) The corrupting sea. A study of the Mediterranean history. Blackwell Publishing, Singapore
- Janson HF (1996) Pomona's harvest. An illustrated chronicle of antiquarian fruit literature. Timber Press, Portland
- Jones-Walters L (2008) Biodiversity in multifunctional landscapes. *J Nat Conserv* 16:117–119
- Jose S (2009) Agroforestry for ecosystem services and environmental benefits: an overview. *Agrofor Syst* 76:1–10
- Kaldjian PJ (2004) Istanbul's bostans: a millennium of market gardens. *Geogr Rev* 94:284–304
- Kizos T, Koulouri M (2006) Agricultural landscape dynamics in the Mediterranean: Lesvos (Greece) case study using evidence from the last three centuries. *Environ Sci Policy* 9:330–342
- Litchfield B (1997) History of the Italian agricultural landscape. Princeton University Press, Princeton
- Loumou A, Giourga C (2003) Olive groves—the life and identity of the Mediterranean. *Agric Hum Values* 20:87–95
- Lupo S (1990) I giardini degli aranci. Il mondo degli agrumi nella storia del Mezzogiorno. Marsilio, Venezia
- MacDonald D, Crabtree JR, Wiesinger G et al (2000) Agricultural abandonment in mountain areas of Europe: environmental consequences and policy response. *J Environ Manage* 59:47–69
- Mazzoleni S, Di Pasquale G, Mulligan M, Di Martino P, Rego F (2004) Recent dynamics of the Mediterranean vegetation and landscapes. John Wiley & Sons Ltd, Chichester
- Meeus JHA (1995) Pan-European landscapes. *Landscape Urban Plan* 31:57–79

- Moreira F, Queiroz AI, Aronson J (2006) Restoration principles applied to cultural landscapes. *J Nat Conserv* 14:217–224
- Mücher CA, Klijn JA, Wascher DM, Schaminée JHJ (2010) A new European landscape classification (LANMAP): a transparent, flexible and useroriented methodology to distinguish landscapes. *Ecol Indic* 10:87–103
- Naveh Z (1995) Interactions of landscapes and cultures. *Landscape Urban Plan* 32:43–54
- Naveh Z, Lieberman A (1994) *Landscape ecology*. Springer, New York
- Nerlich K, Graeff-Hönniger S, Claupein W (2013) Agroforestry in Europe: a review of the disappearance of traditional systems and development of modern agroforestry practices, with emphasis on experiences in Germany. *Agrofor Syst* 87:475–492
- Olmo HP (1995) The origin and domestication of the *Vinifera* grape. In: McGovern PE, Fleming SJ, Katz SH (eds) *The origin and ancient history of wine*, Luxemburg, pp 31–43
- Otero I, Boada M, Tàbara JD (2013) Socio-ecological heritage and conservation of Mediterranean landscapes under global change. A case study in Olzinelles (Catalonia). *Land Use Policy* 30:25–37
- Petanidou T, Kizos T, Soualakellis N (2008) Socioeconomic dimensions of changes in the agricultural landscape of the Mediterranean Basin: a case study of the abandonment of cultivation terraces on Nisyros Island, Greece. *Environ Manage* 41:250–266
- Pinto-Correia T, Cancela d'Abreu A, Oliveira R (2002) Landscape units in Portugal and the development and application of landscape indicators. In: *NIJOS/OECD Expert Meeting—Agricultural Landscape Indicators*, Oslo
- Pinto-Correia T, Ribeiro N, Sá-Sousa P (2011) Introducing the montado, the cork and holm oak agroforestry system of Southern Portugal. *Agrofor Syst* 82:99–104
- Pinto-Correia T, Vos W (2004) Multifunctionality in Mediterranean landscapes—past and future. In: Jongman RHG (ed) *The new dimensions of the European landscape*. Springer, Wageningen
- Sánchez IA, Lassaletta L, McCollin D, Bunce RGH (2010) The effect of hedgerow loss on microclimate in the Mediterranean region: an investigation in Central Spain. *Agrofor Syst* 78:13–25
- Scazzosi L (2004) Reading and assessing the landscape as cultural and historical heritage. *Landscape Res* 29:335–355
- Sereni E (1961) *Storia del paesaggio agrario italiano*. Laterza, Bari
- Sestini A (1963) *Il Paesaggio*. Touring Club Italiano, Milano
- Sicca U (1924) *Grammatica delle iscrizioni doriche della Sicilia*. Arpino
- Sirami C, Nespoulousa A, Cheylard JP, Martya P, Hvenegaarda GT, Geniezh P, Martina JL (2010) Long-term anthropogenic and ecological dynamics of a Mediterranean landscape: impacts on multiple taxa. *Landscape Urban Plan* 96:214–223
- Solymosi K (2011) Indicators for the identification of cultural landscape hotspots in Europe. *Landscape Res* 36:3–18
- Stoate C, Baldi A, Beja P, Boatman ND, Herzon I, van Doorn A, Snoo GR, Rakosy L, Ramwell C (2009) Ecological impacts of early 21st century agricultural change in Europe—a review. *J Environ Manage* 91:22–46
- Terral JF (2000) Exploitation and management of the olive tree during prehistoric times in Mediterranean France and Spain. *J Archeol Sci* 27:127–133
- Trischitta D (1983) *Toponimi e paesaggio nella Sicilia orientale*. Edizioni Scientifiche italiane, Napoli
- Venturi Ferriolo M (1989) *Nel grembo della vita. Le origini dell'idea di giardino*. Guerini e Associati, Milano
- Venuto A (1516) *De Agricultura opusculum*, per Sigismondo Mayr Alemano, Napoli
- Vicente AM, Alés RF (2006) Long Term persistence of dehesas. Evidences from history. *Agrofor Syst* 67:19–28
- Vogiatzakis IN (2011) Mediterranean experience and practice in landscape character assessment. *Ecol Mediterranea* 37:17–31

- Vos W, Klijn J (2000) Trends in European landscape development: prospects for a sustainable future. In: Klijn J, Vos W (eds) From landscape ecology to landscape science. Kluwer Academic Publishers, Dordrecht, pp 13–29
- Vos W, Meekes H (1999) Trends in European cultural landscape development: perspectives for a sustainable future. *Landscape Urban Plan* 46:3–14
- Watson AW (1983) *Agricultural innovation in the early islamic world*. Cambridge University Press, Cambridge
- Zimmermann RC (2006) Recording rural landscapes and their cultural associations: some initial results and impressions. *Eviron Sci Policy* 9:360–369
- Zohary D (1995) Olive. *Olea europaea* (oleaceae). In: Smartt J, Simmonds NW (eds) *Evolution of crop-plants*. Longmans, London, pp 279–382
- Zohary D, Hopf M (1993) *Domestication of plants in the old world*. Clarendon Press, Oxford

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