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Monumental trees and old-growth forests in Sardinia (Italy)

Abstract

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Old, veteran and notable trees are ecologically important keystone organisms, have tangible connections to folklore, history and, sociocultural practices, and functional characteristics fundamental for sustaining complex and unique assemblages of species. These trees can be found in different landscapes, ranging from remote mountain areas to cities, historical gardens and, agricultural areas.

In Italy, an official list of monumental trees was recently published under the national law no. 10/2013 and the ministerial Decree 23 October 2014. A number of criteria can be used to identify these trees such as age and/or size, shape and growth habit, ecological value, floristic rarity, interest for its architectural structure, landscape quality, and historical, cultural and religious value.

In this article we aim to provide some general information on monumental and notable trees in Sardinia, as well as on old-growth forest, based on the recent monograph published for Sardinia by I. Camarda.

Key words: monumental tree and shrubs, cultural heritage, Sardinia.

Introduction

Old, veteran and notable trees are ecologically important keystone organisms, have tangible connections to folklore, history and sociocultural practices (Nolan & al. 2020; Kabassi & al. 2021; Petruccelli & al. 2021), functional characteristics fundamental for sustaining complex and unique assemblages of species (Zapponi & al. 2017; Wetherbee & al. 2020), and play an important role in carbon storage and dynamics (Stephenson & al. 2014). These trees can be found in different landscapes, ranging from remote mountain areas to cities, historical gardens and agricultural areas (Anestiadou & al. 2017; Ninot & al. 2018, Camarero & al. 2021; Schicchi & al. 2021), and humans influence the distribution of veteran trees throughout their range, but in different ways in forests and open landscapes (Skarpaas & al. 2017).

In 1982, the Italian State Forestry Corps launched the first “National Census of trees of considerable interest”, on the whole Italian territory to identify and catalog single plants or groups, which had peculiar characteristics: exceptional size compared to the species, singular shapes, aesthetic qualities and historical value. This census

was not supported by a national regulatory system, and the State Forestry Corps collaborated with the forest services of the Italian regions (Farina 2018). The amount of data collected over time was surprising: from the 22,000 reports submitted by the assessors, 1,255 trees were selected and, of these, 150 of “exceptional historical and monumental value”. The five species with most veteran trees in the data set were *Quercus pubescens* (211), *Fagus sylvatica* L. (112), *Cedrus libani* A. Rich. (58), *Castanea sativa* Mill. (52) and *Quercus ilex* L. (52). Species of the genus *Quercus* L. comprised 35% of the veteran trees reported (Pautasso & Chiarucci 2008; Farina 2018).

The Italian official list of monumental trees was recently published under the national Law no. 10/2013 and the ministerial Decree (October 23, 2014), and updated in the following years¹, with a final total number of 3,662 monumental trees in Italy in 2021. A number of criteria are used to identify these trees: age and/or size, shape and growth habit, ecological value, floristic rarity, interest for its architectural structure, landscape quality, and historical, cultural and religious value.

According to the Italian agreed definition (Blasi & al. 2010a, 2010b) old-growth forests are forests in which human disturbance is absent or negligible, and in which natural dynamics create a mosaic of all the forest regeneration phases, including the senescent one. Such phase is characterized by large old trees, deadwood (snags, logs, and coarse woody debris) and a vascular plant species composition that is consistent with the biogeographical context and includes highly specialized taxa related to the small-scale disturbance and the microhabitats resulting from structural heterogeneity. Within the Italian inventory (Blasi & al. 2010a) two sites were included for Sardinia, both included in the area of the Gennargentu massif. Old growth forests are increasingly considered and studied all around the world. However, the knowledge of such important forest systems is still limited in some bioclimatic regions, such as in the Mediterranean Basin (Badalamenti & al. 2018).

As it often occurs in the case of legislation and definitions in the forest and forestry sector (Pötzelsberger & al. 2020), also in the case of monumental trees and old-growth forest there is some puzzle resulting by a stratification of International, national, and regional legislation that have been implemented in different periods and for different purposes (Ferrucci 2021).

In this article we aim to provide some general information on monumental and notable trees in Sardinia, as well as on old-growth forest, based on the recent monograph published for Sardinia (Camarda 2020).

¹The national list “Elenco degli alberi monumentali d’Italia” was first approved by the “Decreto del Capo Dipartimento delle politiche europee e internazionali e dello sviluppo rurale del Ministero delle politiche agricole e forestali” no. 5450 of 19.12.2017, and published in the Gazzetta Ufficiale of February 12, 2018. It has been updated with Decreto Dirigenziale (DD) no. 661 of 09.08.2018, DD no. 757 of 19.4.2019, DD no. 9022657 of 24.07.2020, and – finally – with DD no. 0205016 of 05.05.2021.

The many steps towards a Sardinian inventory of monumental trees

The very first information on Sardinia trees is found in the work of Fara (1580-85) although it is reported without specific information on individual's size and age. Actually, Moris (1837) and other botanist of the XIX century which studied the flora of Sardinia did not pay much interest to monumental and veteran trees, although they highlighted the presence, distribution and uses of non-native tree species in the island. On the contrary, other writers and voyagers reported more information on monumental trees (e.g., Angius 1833, 1841, 1856; Valery 1837, 1838; Delessert 1855; Cugia 1892). A more careful description of monumental and veteran trees started at the end of the XX century, thanks to the work of regional botanist and forest experts (Camarda & Valsecchi 1985, 2008, Vannelli 1987, 1989, 1994; Camarda 1997), but it is only in the XXI century the Sardinian botanists started to investigate more systematically on this natural asset, often in collaboration with regional authorities such as the Sardinian Forest Agency and the National (CFS) and Sardinian (CFVA) Forestry Corps (Bacchetta 2006; Camarda & Valsecchi 2008).

More specifically, in 1982, the “National Census of trees of considerable interest” by the Italian State Forestry Corps included 44 monumental trees for Sardinia, belonging to 14 species. In addition, according to the Sardinian regional Law of the June 6, 1989, no. 31² a number of areas with natural trees or garden with trees have been included inside the protected category of “natural monuments”, as in the case of the historical olive-groove of “S'Ortu Mannu” (DADA no. 73, 19.08.2008) and of Luras wild olive tree (DADA no. 32, 09.10.2013). During 2003, the Sardinian Forest Agency (DGR no. 48/42 30.12.2003) was in charge to deal with the regional inventory for Sardinia, producing an updated list with 611 records (Camarda, Lampre, Murgia and Casula, 2010). In 2006, the Sardinian Regional Landscape Plan³, included a definition for the monumental trees [art. 17] and a list of 100 trees belonging to 45 species, which were mainly those reported also by Vannelli's inventories (Vannelli 1989, 1994).

Later, information for Sardinia was included in “The Italian official list of monumental trees” produced and published under the national Law no. 10/2013, with the regional support of the Regional Forestry Corps. The Italian official list of monumental trees was published under the national Law no. 10/2013 and the ministerial decree of October 23, 2014 and updated in the following years, with a final total number of 410 monumental trees in Sardinia in 2021.

Meaningful, the Sardinian regional Law (April 27, 2016, no. 8), at its article 28.2.b promotes actions to preserve monumental trees.

²Sardinia Region, Regional Law 7 June 1989, n. 31 “Rules for the establishment and management of parks, reserves and natural monuments, as well as areas of particular naturalistic and environmental importance”.

³Sardinia Region, Resolution of the Regional Council, 5 September 2006, n. 36/7 “Regional Law no. 8 of 25.11.2004, article 1, paragraph 1. Approval of the Landscape Plan - First homogeneous area” (BURAS 8 September 2006, no. 30).

Monumental, notable trees, and old-growth forests in Sardinia

In 2020, based on the information available from previous inventories, and as a result of many years of systematic surveys along the whole territory of Sardinia, aiming to confirm and evaluate records, I. Camarda published a comprehensive synopsis of monumental and notable trees and old-growth forest of Sardinia (Camarda 2020). This synopsis included a total of 43 old-growth forests and 701 monumental or notable trees, belonging to 65 different native (Fig. 1A) and 63 exotic species (Fig. 1B).

The most common species among veteran trees in the data set were *Quercus ilex* (73), *Olea europaea* var. *sylvestris* (Mill.) Brot. (51), *Q. pubescens* (46), *Q. congesta* C. Presl (40) and *Q. suber* (38), *Taxus baccata* L. (31), *Pistacia lentiscus* L. (26), *Acer monspessulanum* L. (17), *Castanea sativa* (15) and *Ceratonia siliqua* L. (14). Species of the genus *Quercus* comprised 29 % of the 701 veteran trees reported.

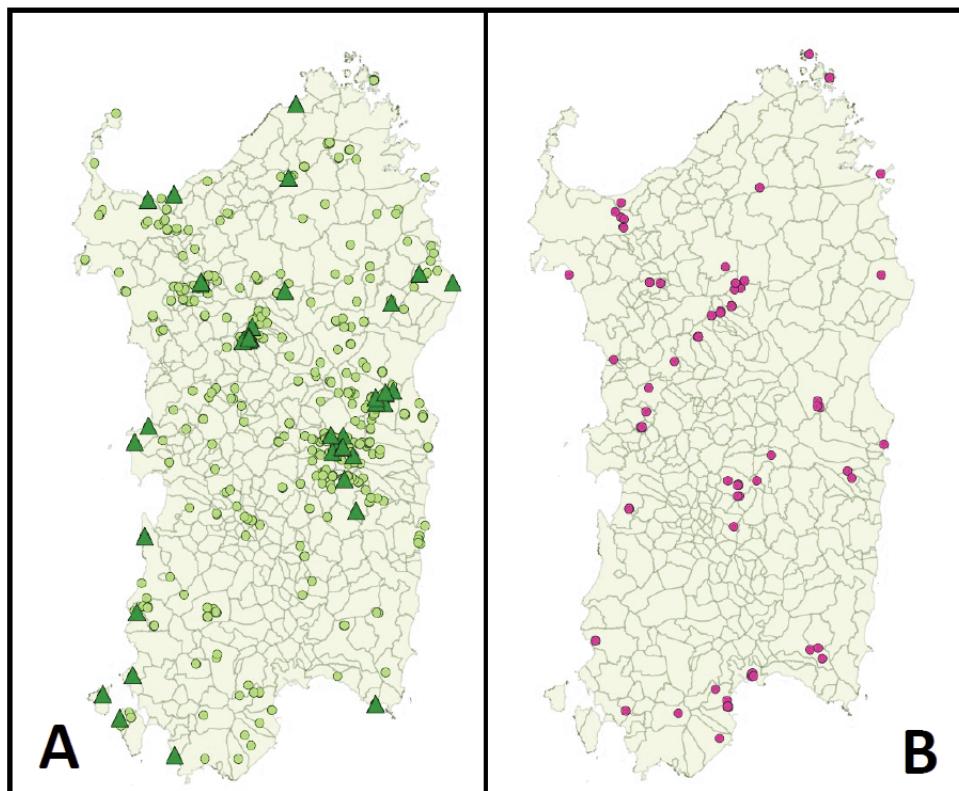


Fig. 1. A, B. Map from the synopsis of Camarda (2020). On the left (A) the distribution in Sardinia of the 43 old-growth forests (triangle) and of the native monumental trees (circle). On the right (B) the distribution of the non-native monumental trees.

The three types of most represented old-growth forests are the *Juniperus macrocarpa* Sm. forest (10), the *Quercus ilex* forest (t) and the *Taxus baccata* – *Ilex aquifolium* mixed forest (4). However, species of the genus *Quercus* comprised 29.5% of the 44 old-growth forests reported, while *Juniperus* scored 27%. Other important types of old-growth forest are those characterised by the presence of veteran trees of *Pistacia lentiscus* (Camarda & Ruiu 2021), *Arbutus unedo*, and *Phillyrea latifolia* L. Although these species are more commonly observed as seedlings of shrubs, in a few sites they reach full monumental sizes as trees, both in height and diameters, and stably dominate the plant community.

The age of monumental and veteran trees is usually not always easy to establish, and the degree of accuracy of tree-age estimates can vary depending upon the previously available data on each tree species and upon the methods used (Altman & al. 2016; Ehrlich & al. 2017; Génova Fuster & Sadornil 2020). Annual growth rates of the trunk for some combinations of species and sites in Sardinia might be very low, and age estimation in evergreen species presents additional issues.

However, it is very likely that a number of trees of *Taxus* and *Olea* may reach and age of more than one thousand years, as in the case of *Olea europaea* var. *sylvestris* plants at Luras and Sarule villages, *Taxus baccata* at the site of Badde Salighes (Bolotana) and at Padente sas Iscalas (Fonni), and *Juniperus oxycedrus* L. at Erbelothori (Villagrande). Other trees reach an age of more than 500 year, as in the case of many monumental and veteran trees of *Quercus ilex*, *Q. pubescens*, *Ilex aquifolium*, *Acer monspessulanum*, *Q. suber*, *Alnus glutinosa* (L.) Gaertn., *Phillyrea latifolia*, and *Pistacia lentiscus*. Similarly, the monumental plants of *Myrtus communis* L. at San Pietro in Silki (town of Sassari), may have an age close to 500 years. In the case of trees planted in historical gardens, there is sometimes more precise information on the planting date, as in the case of *Pinus pinea* L. at Caprera, *Abies pinsapo* Boiss. at Badde Salighes, and *Ficus macrophylla* Desf. ex Pers. in Cagliari.

Non-native monumental and notable trees

The first and more relevant period of introduction of non-native trees in Sardinian dates back to the beginning of the XIX century, with the institution in 1866 of the Botanic Garden of Cagliari (Cavara 1901), and later of the Botanic Garden of Sassari. The most common non-native tree species (*Eucalyptus*, *Pinus*, *Abies*, *Pinus*, *Platanus*) have been largely planted in public and private gardens, in afforestation practices both in private and public land, and in a network of provenance trials (Pavari and De Philippis 1941). Single individual trees of the genera *Eucalyptus*, *Cedrus* and *Platanus* reached in many cases monumental sizes, while a few species, e.g., *Ailanthus altissima* (Mill.) Swingle escaped from plantation sites becoming highly invasive in several types of habitats.

A group of rare species is found outside the Botanic Garden of Cagliari, and are species commonly found in Italian and European gardens, such as *Taxus wallichiana* Zucc., *Ceiba speciosa* (A.St.-Hil.) Ravenna, *Cinnamomum camphora* (L.) J. Presl, *Chamaecyparis lawsoniana* (A. Murray bis) Parl., *Colletia paradoxa* (Spreng.) Escal., *Gleditsia triacanthos* L. and *Abies pinsapo*.

Final remarks

Monumental, veteran and notable trees in Sardinia include native and non-native tree species (both neophytes and archaeophytes), and have comparable sizes and relevance with the national monumental trees. Highly significant monumental trees are found among the species *Quercus ilex*, *Q. pubescens*, *Taxus baccata*, *Acer monspessulanum*, *Alnus glutinosa*, *Ostrya carpinifolia*, *Juniperus oxycedrus*, *Olea europaea* var. *sylvestris*, *Pyrus spinosa* Forssk., *Castanea sativa*, and *Juglans regia* L. Nevertheless, *Myrtus communis*, *Pistacia lentiscus*, *Arbutus unedo* L. and *Phillyrea latifolia*, although more commonly found as treelets of shrubs, do feature also monumental individuals. The system of monumental trees and old-growth forest of Sardinia is a fundamental asset for the study and conservation of Mediterranean biodiversity, history and culture.

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