

Data paper

## Tree inventory data of *Pinus nigra* J.F.Arnold subsp. *calabrica* (Poir.) Maire in southern Italy

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**Abstract** - The dataset supplied in this article provides data from a stand of *Pinus nigra* J.F.Arnold subsp. *calabrica* (Poir.) Maire (Calabrian black pine) characterized by old trees, with a relevant role for forest community biodiversity. Natural stands of Calabrian black pine have both outstanding conservation and cultural values, to be taken under consideration in forest and land use management and monitoring plans.

A time series of dendrometric parameters is provided for 58 pine trees: the data were collected during three forest surveys (in 1976, 1986 and 2016). These data, in combination with other forest stand and environmental parameters, may effectively contribute to understand the dynamics of Calabrian black pine forests in southern Italy, thus how the natural and human disturbances have affected the structure and species composition of these forest ecosystems with high ecological value.

Dataset access at <https://zenodo.org/record/1100340>. Associated metadata available at <https://zenodo.org/record/1100340>.

**Keywords** - Ancient tree; Biogenetic Natural Reserve Fallistro; Conservation; *Pinus nigra* subsp. *calabrica*; Sila

### Introduction

Trees with particular morphological, size- and age-related characteristics have always attracted human attention (Anderson 2004). Forest stands with extraordinary features (e.g. ecological role within the plant community, adaptation to environmental constraints) have been widely studied and monitored (Green 2001, Fay 2002). In the last decades, phenological, dendrometric and dendro-chronological monitoring activities have been used to investigate old growth trees and forests with important botanic and ecological features, in addition to their high cultural and landscape values (Kirby et al. 1998).

Several inventories of giant trees exist in the world, but most of them are lacking of a systematic survey (Loriente Escallada 1982, Hallett 1989, Alessandrini et al. 1990a,b, Bourdu and Feterman 1998, Fröhlich 1998, Vargas Márquez 1997, Esterhuysen et al. 2001, Owen 2003).

Tree inventories are tree data collections (i.e. dendrometric, health status, growth data), collected in several time frames, with monitoring purposes. Rarely, dendrometric and growth data of ancient, old-growth forest trees are available for a consistent number of trees and time series. An inventory with a robust scientific basis should aim at presenting a reliable picture of the existing population of trees according to predefined selection criteria (Kreb et

al. 2005).

In Italy there are many centuries-old trees, located in historic gardens, parks and even in the open countryside (see Alessandrini et al. 1990a,b, Capodarca, 1984, OPHRYS, 2012, <https://www.politicheagricole.it/flex/cm/pages/ServeBLOB.php/L/IT/IDPagina/11260>). Ancient trees are important parts of ecosystems and are usually included in ecological studies of forest management (Gilg 2005, Horák 2017). The loss of ancient trees in woodlands and open landscapes would lead to the loss of saproxylic organisms, birds, therefore an important part of the forest biodiversity. Hence, the persistence of many specialized insects depends on the presence of ancient trees scattered in woodlands (e.g. ancient wood pastures, game parks or protected areas), cities, towns and villages (e.g. avenues, parks or chateau parks) or open landscapes (Horák 2017).

Forests and urban green systems with big and ancient trees, that enhance biological diversity, stand structure and landscape complexity, have a great recreational and landscape values (Mattioli et al. 2013), especially pinewoods. Pine species are landmarks of the Italian landscape, both in coast and hilly areas, with a high historical and cultural value (Gasparella et al. 2017).

In this paper a dataset of dendrometric data of Calabrian black pines is reported. The dataset is the result of three forest surveys carried out over 40 years by the Research Centre for Forestry and

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Wood in the Sila National Park (southern Italy). 58 Calabrian black pine trees, locally known as “giant pines”, were sampled, measured and data were collected over three annual inventories (1976, 1986 and 2016).

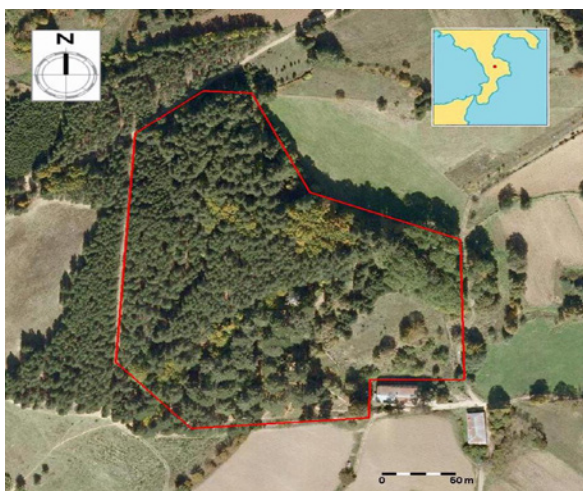
## Methods

### Study site

#### *The Biogenetic Natural Reserve of Fallistro*

The Biogenetic Natural Reserve of Fallistro is a forest of *Calabrian black pine* planted in the middle of the 17<sup>th</sup> century, using natural regeneration of Calabrian black pine collected from the surrounding forest areas, in order to create a topsoil protection from cold winds as well as a shelter for shepherds and animals (Bonavita et al. 2016, Avolio and Ciancio 1985). The reserve was established in 1987 by the Italian Ministry of the Environment. It is located in the basin of the Neto River, in Sila Grande, in the Municipality of Spezzano della Sila (province of Cosenza, 39°19'27"N, 16°28'03"E). It extends for 6.5 hectares (Fig. 1). The forest stand is uneven-aged, including about 1500 trees, some of which are estimated to be over 390 years old (Avolio and Ciancio 1985). In this area, no current anthropic activities are carried out and the reserve of Fallistro has been left to natural evolution since 1986. The altitude ranges between 1398 and 1448 m a.s.l., the bedrock is siliceous and the soil is poorly developed. In addition to black pine, there are other tree species in the overstory layer, among them *Populus tremula* L., *Fagus sylvatica* L. and *Acer pseudoplatanus* L., while in the understory there are few woody and herbaceous species. All the giant pines have been monitored over 40 years (58 trees in total) are characterized by an extraordinary size: tree stems have column shape and can reach the height of 45 m and a diameter at breast height of 2 m.

In Sila Grande the reserve of Fallistro is the forest



**Figure 1** - Biogenetic Natural Reserve of Fallistro (Geoportale Regione Calabria).

with the greatest number of ancient Calabrian black pines. It had not undergone any human disturbance until the Italian unification (1861), when an intensive exploitation of forest resources began (Anzilotti 1950). The Fondo Italiano Ambiente (Italian National Foundation for the conservation and valorization of the historical and cultural heritage and landscape) manages the reserve since 2016.

Calabrian black pine is an interesting *taxon* with natural distribution in the Mediterranean basin: this subspecies is spontaneous in Italy in the southern Appennines, especially in Calabria and Sicily. In Calabria, Calabrian black pine covers about 1000 km<sup>2</sup>; smaller populations are in eastern Sicily (Etna) (Farjon 2013). Nowadays there is no evidence of a decline of the species, although natural stands have been frequently logged and often replaced by other woodland types or cultivations in the past, and are threatened by environmental disturbances, especially fires. Several major stands are within protected areas in the three major areas of distribution of the subspecies (Corsica, Calabria and Sicily) (Farjon 2013).

### Field measurements

Tree height, crown depth (estimated as the difference between tree height and height of the lowest branch) and stem circumference at breast height were measured in 1976, 1986 and 2016, with a hypsometer and a measuring tape, respectively. Circumference measurement was used to calculate the diameter at breast height and basal area of each sampled pine, while stem volume was calculated by models using stem diameter at breast height, height and a coefficient of reduction (i.e. geometric form factor) of 0.529, calculated from pines naturally fallen on the ground. The height of the first living whorl was visually estimated.

### Dataset

To describe the characteristics of the pine stand, a tree-level dataset was compiled with the following variables: diameter at breast height (DBH), tree height ( $H_t$ ), height of the first living whorl ( $H_w$ ), crown depth (CD), basal area (BA) and stem volume (V) for each sampled tree. The data were collected during three surveys in 1976, 1986 and 2016.

### Access to data and metadata description

The dataset can be download using the following reference Pollastrini Martina, Plutino Manuela, Avolio Silvano, & Bernardini Vincenzo. (2017). Tree inventory data of *Pinus nigra* J.F.Arnold subsp. *calabrica* (Poir) Maire in southern Italy [Data set] Zenodo <http://doi.org/10.5281/zenodo.1100340>. Associated metadata available at <https://zenodo.org/record/1100340>

### Technical validation

The dataset includes 58 trees measured in 1976, 1986 and 2016. The data of each tree has been carefully checked before the publication, avoiding misspelling or error among data collected in different time.

### Reuse and utility of the dataset

In spite of the lack of growth data for Calabrian black pine trees at annual resolution (increment cores), the dataset of dendrometric attributes here described allows to study the population dynamic of Calabrian black pine stands and the role of ancient trees in the structure, stability and biodiversity of coniferous forests. The dataset may have the potential to provide important information for management, conservative purposes and health status monitoring of Calabrian black pine in relation to natural and anthropogenic disturbances and climate change.

### References

- Alessandrini A., Bortolotti L., Fazzuoli F., Mitchell A., Nievo S., Rigoni Stern M. 1990a - *Alberi monumentali d'Italia. 1: Isole e centro Sud*. Roma, Edizioni Abete, Roma.
- Alessandrini A., Bortolotti L., Fazzuoli F., Mitchell A., Nievo S., Rigoni Stern M. 1990b - *Gli alberi monumentali d'Italia. Il Centro e il Nord. Vol. 2* Edizioni Abete, Roma.
- Anzilotti F. 1950 - *Il pino laricio silano*. Monti e Boschi 3: 107-116.
- Anderson K. 2004 - *Nature, culture, and big old trees: live oaks and ceibas in the landscapes of Louisiana and Guatemala*. Austin, University of Texas Press.
- Artese C. 2015 - *Monumental trees of Abruzzo: from knowledge to the protection*. Italian Journal of Forest and Mountain Environments 70 (6): 453-462. DOI: 10.4129/ifm.2015.6.05
- Asciuto A., Borsellino V., D'Acquisto M., Di Franco CP., Di Gesaro M., Schimmenti E. - 2015. *Monumental trees and their existence value: case study of an Italian natural park*. Journal of Forest Science 61 (2): 56-61. DOI: 10.17221/86/2014-JFS
- Avolio S., Ciancio O. 1985 - *The Sila giants*. Annali Istituto Sperimentale per la Selvicoltura 16: 373-421.
- Bonavita S., Vendramin G.G., Bernardini V., Avolio S. Regina TMR. 2016 - *The first SSR-based assessment of genetic variation and structure among Pinus laricio Poirét populations within their native area*. Plant Biosystems 150 (6): 1271-1281. DOI: 10.1080/11263504.2015.1027316
- Bourdu R., Feterman G. 1998 - *Arbres de memoire: arbres remarquables en France*. Arles, Actes Sud Éditions, Éditions Masson.
- Cannizzaro S., Corinto GL. 2014 - *The role of monumental trees in defining local identity and in tourism. a case study in the Marches region*. Geoprogess Journal 1 (1): 29-48.
- Capodarca V. 1984 - *Marche. Cinquanta alberi da salvare. I più importanti della regione*. Vallecchi Editore S.p.A., Firenze.
- Esterhuyse N., von Breitenbach J., Söhnge H. 2001 - *Remarkable Trees of South Africa*. Pretoria, Briza Publications.
- Fay N. 2002 - *Environmental Arboriculture, Tree Ecology & Veteran Tree Management*. Arboricultural Journal 26(3): 213-238. DOI: 10.1080/03071375.2002.9747336
- Farjon A. 2013. *Pinus nigra ssp. laricio*. The IUCN Red List of Threatened Species 2013: eT20453493A20453502. <http://www.iucnredlist.org/details/20453493/0>
- Fröhlich HJ. 1989 - *Alte liebenswerte Bäume in Deutschland*. Cornelia Ahlering Verlag, Hamburg.
- Gasparella L., Tomao A., Agrimi M., Corona P., Portoghesi L., Barbati A. 2017. *Italian stone pine forests under Rome's siege: learning from the past to protect their future*. Landscape Research 2: 211-222.
- Gilg O. 2005. *Old-growth forests. Characteristics, conservation and monitoring. Habitat and Species Management*. Technical Report n. 74 bis.
- Green T. 2001 - *Should ancient trees be designated as Sites of Special Scientific Interest?* British Wildlife. 12 (3): 164-166.
- Hallett V. 1989 - *The tree register of the British isles*. Arboricultural Journal, 13:147-149.
- Horák, J. 2017 - *Insect ecology and veteran trees*. J Insect Conserv 21 (1): 1-5. DOI: 10.1007/s10841-017-9953-7
- Kirby K. J., Reid CM., Isaac D., Thomas RC. 1998 - *The ancient woodland inventory in England and its uses*. In: The ecological history of European forests. CAB International: 323-336.
- Krebs P., Conedera M., Fonti P. 2005 - *The Inventory of the Giant Chestnut Trees in Southern Switzerland*. Acta Horticulturae, III International Chesnut Congress, Chaves. DOI: 10.17660/ActaHortic.2005.693.20
- Lorient Escallada, E. 1982. *Arboles singulares de Cantabria: guía para su conocimiento y conservación*. Santander, Institución Cultural de Cantabria Diputación Provincial, 221 p.
- Mattioli W., Mancini L.D., Angelini A., Geraci P., Merlini P., Portoghesi L. 2013. *Analisi dell'intensità di diradamento e dei danni delle utilizzazioni in una pineta con funzione ricreativa*. L'Italia Forestale e Montana 68 (6): 283-293.
- OPHRYS 2012 - *La Mappa degli Alberi Monumentali in Italia*. [http://www.molisealberi.com/alberiitalia\\_dettaglio.asp?regione=1&idalberiitalia=2](http://www.molisealberi.com/alberiitalia_dettaglio.asp?regione=1&idalberiitalia=2)
- Owen J. 2003 - *Champion trees of Britain and Ireland*. Bedford, The Tree Register of the British Isles, Whittet Books.
- Vargas Márquez F. 1997 - *Compendio de Árboles históricos y notables de México*. México, Instituto Nacional de Ecología, INE, SEMARNAP.

### Web site

<https://www.politicheagricole.it/flex/cm/pages/ServeBLOB.php/L/IT/IDPagina/11260>. Elenco nazionale alberi monumentali d'Italia ai sensi della Legge n. 10/2013 e del Decreto 23 Ottobre 2014

### Contribution of the co-authors

The authors contributed equally to prepare the dataset and writing the manuscript.